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The Railway and Locomotive Historical Society, INC.

COMMITTEE IN CHARGE OF PUBLICATIONS

During the past two years we have been fortunate enough to reproduce in our publication, papers covering a particular subject and written by our members who have specialized in that subject for some time. The result of this effort is obvious as it gives the person an opportunity to study and to procure material relating to that subject without being distracted to other interests. With this thought in mind, your Editor is making this suggestion to some of our younger members who have the time to spare and who are looking for new fields to cover, and for any of our older members as well.

Within the last decade we have seen many miles of railroads abandoned, many of the lighter locomotives retired from service and some of the smaller roads go out of business. The latter have gone for good and will never return. Such documents as relate to their history have either been scattered or destroyed or put beyond our reach. Locomotives which have been scrapped are past the picture taking stage and many of these locomotives now on side tracks will never see service again, but there is always a chance that some old attic or retired veteran or collector has a photograph. With the prospect of future railroad consolidations, it probably means that many of the smaller lines which have so far survived this depression, will eventually become parts of the larger systems and thus their individuality will become lost. It is with regard to the latter that we are chiefly concerned and towards which we might well direct our efforts.

Some time this spring, one of our members learned that the Sandy River & Rangeley Lakes R. R. was to be abandoned. This, as you may recall, was the largest 2′ gauge road in the State of Maine. In addition to procuring such documentary material as time tables, tickets, etc.,

he took his camera and took photographs of such motive power, equipment, buildings and right of way as he was able. He interviewed men connected with the motive power and thus was able to produce a complete roster of the road's locomotives. By means of exchanges, he has been able to fill in many of the gaps and his collection stands today as the most complete which has ever been assembled. In doing this work he has not forgotten this Society. The lesson seems obvious to those of the picture taking or collecting fraternity.

The majority of us follow the course of least resistance. We take such items as come easiest to hand without giving a thought as to whether it fits into the general scheme, even if we have one. The picture "fiend", after securing permission, goes into a busy engine terminal and uses up spool after spool of film. Or he may take his stand beside a busy trunk line and snap train after train as it goes by. Numerically, this is a fine way to build up a collection but how about the similarity. If Americans must think in terms of numbers, you must remember that the only distinction between locomotives of the same class is the number-plate. Get two or three good views of each class or trains in motion, if you will, but improve your opportunity now by following the example of our member and procure such material as you are able on these smaller roads. You will never regret it.

Lastly, specializing need not limit your interest. Some of our members have found that it calls for considerable ingenuity and patience to add new items to their collections. Some of our members are interested in only one or two roads and their subsidiaries; another collects photographs of engines constructed prior to 1900; another collects photographs of locomotives built by a certain builder; still another is interested in roads in his native state; another is interested in the roads on the west bank of the Hudson River and others are interested in roads in their locality. These members have been able to specialize without limiting their general interests. Have as many side lines as you wish but also have a definite aim. Keep the smaller roads in mind. They are well worth your study and effort. Information and data, as well as photographs, now easily obtainable, may be an impossibility in the not too distant future.

Cover Design

Our fellow member and artist, Mr. O. Kuhler has again favored us with one of his sketches for our cover. The Hoosac Tunnel was constructed with its highest point in the middle of the tunnel thus causing the trains to drift through the last half as they proceeded in either direction. Mr. Kuhler has depicted Fitchburg R. R. No. 6 just as she emerged from the portal with her train and we are sure our members will appreciate the cleverness and the skill of the artist.

The Great Western Railway

NOTES ON THE BROAD GAUGE PERIOD 1835 - 1892

By Richard E. Pennoyer

IN ANY account of the development of railways, the Great Western of England, which celebrated its centenary in August 1935, must always hold a pre-eminent place. It was the great rival of the Stephenson tradition, a superb, and original conception of what a railway should be, as against the slow rule of thumb growth followed by the Stephenson school; and though its main characteristic went down to defeat when faced with commercial expediency, it remains one of the greatest railway achievements of the first half of the last century. In this short article it is proposed to show what type of men were responsible for its construction and the design of its rolling stock, to describe a few of its principal engineering features and its express locomotives, and to illustrate these in some detail up to the time of the abolition of its broad gauge in May 1892.

As soon as the steam locomotive had been proved a commercial success in the north of England by Stephenson and his collaborators, proposals for a line between Bristol and London were put forward, and early in 1833 the Merchant Adventurers of Bristol and the Chamber of Commerce of that city—then the second most important town in the Kingdom—appointed a committee which reported in favour of the project, and were able to secure sufficient money "for the purpose of procuring surveys and estimates for a quadruple line of railway between Bristol and London."

From the terms of this resolution it will be seen that even at that date the Bristol Committee approached the project in a large way, and on August 9th, 1833, they met a London Committee in joint session and the title of "Great Western Railway" was adopted. At this meeting the engineer who was to carry out the project was also decided on, and its construction on a scale hitherto unknown in the engineering world became inevitable, for the Committee appointed Isambard Kingdom Brunel as Chief Engineer.

Brunel was 27 at the time he joined the Company, and until his death in 1859, the Great Western Railway was the chief interest of his life. From the beginning he saw eye to eye with his Committee, as he did with his Board of Directors when that body was set up on the passage by Parliament of the Company's Bill. He approached the problem they put to him in the grand manner; he produced a railway fully entitled to be called great; and he provided an instance sufficiently rare in the annals of engineering of a work of the magnitude of this line, which was from start to finish the result of one man's brilliancy and genius.

Brunel was born in 1806. His father, Sir Mark Brunel, the builder of the Thames Tunnel, the first successful work of its kind, was originally a Frenchman. A naval officer and a strong Royalist, he escaped from

France with difficulty during the French Revolution, spent some years in New York in the practice of civil engineering, serving for a time as Engineer to the State, and finally settled in England where he became naturalized and married.

Brunel, who inherited to the full the brilliance and logic of his father's French mind, grew up so to speak during the early stages of modern engineering, as he entered his father's office at 17 and took an active part in the construction of the Thames Tunnel. He was already well known at the time of his appointment to the Great Western Railway through the winning design he had submitted for the Clifton Suspension Bridge near Bristol, his most important competitor being the famous Telford.

During a good part of the last century specialization in engineering was practically unknown, and throughout Brunel's short and immensely active life there was hardly a phase of it that he did not touch and enrich both in theory of design and in execution.

He excelled as a bridge builder; in masonry, timber and wrought iron he left brilliant examples of construction, many of which are still in use to-day. One of his best known designs in brickwork is the Maidenhead Bridge carrying the main line of the Great Western Railway over the Thames not far from London. The construction of this bridge caused great controversy at the time, for the two main arches are some of the largest and flattest brick arches ever built, being semi-eliptical with a span of 128 feet, the rise being 24 ft. 3 inches and the curvature of the crown being on a radius of 165 feet, with a pressure on the brick work at this point of ten tons per square foot. The design is gracefulness itself, and doubled in width on its original lines in 1893, is carrying the heaviest main line traffic to-day.

A key to Brunel's instinctive and skillful use of materials is found in a letter of his which reads in part as follows:

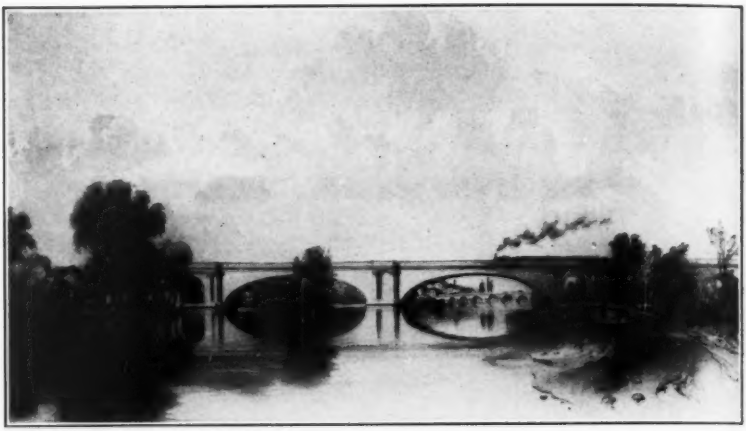
"You cannot take too much pains in making everything in equilibro; that is to say all forces should pass *exactly* through the points of greater resistance. . . . Consider all structures, all bodies and all materials of foundations to be made of very elastic india rubber, and proportion them so that they will stand and keep their shape: you will by those means diminish greatly the required thickness: *then add 50%*. I have found that there is not a single substance we have to deal with, from cast iron to clay, which should not practically be treated strictly as a yielding elastic substance."

An interesting example of his work in timber is the arched bridge he built in 1841 to carry his main line over the River Avon at Bath. The distance across the river is only 80 feet, but the angle of crossing is so oblique that the length of the bridge is 164 feet, each span being 80 feet. The six laminated ribs forming the arch were composed of five layers of six inch pine, these being bolted together and iron tie rods connected the ends of the ribs, the floor being carried on cast iron arched uprights filling the spandrils. This bridge was in service until it was replaced by an iron girder in 1878.

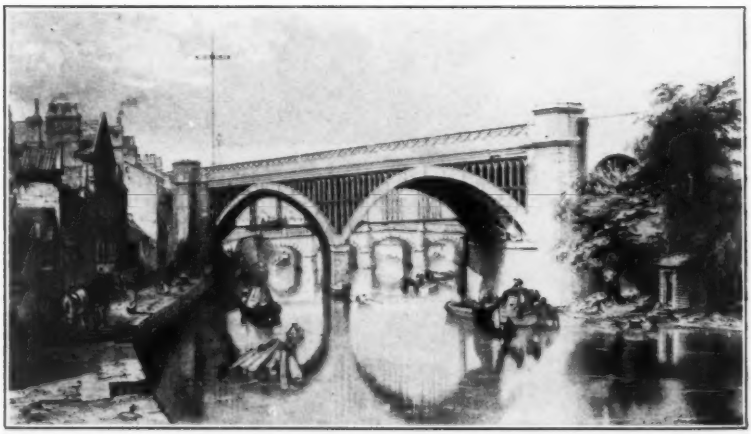
Brunel designed some 81 viaducts for the Great Western Railway, 65 of these, built of timber, being in Devonshire and Cornwall alone. A system of standard dimensions was used throughout. The masonry

ISAMBARD KINGDOM BRUNEL

From a portrait painted by his brother-in-law, J. C. Horsley, A.R.A.

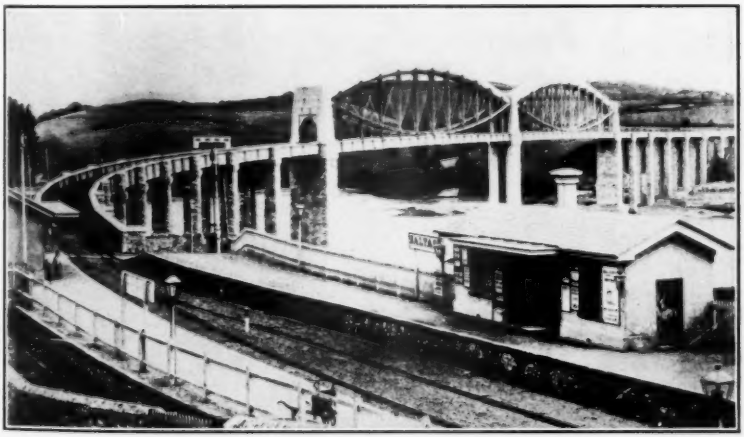


Maidenhead Bridge over the River Thames.



Timber Arched Bridge over the River Avon at Bath.

Typical example of Brunel's Timber Viaducts. The train shown is standard gauge.



Royal Albert Bridge at Saltash over River Tamar.

Portal of Box Tunnel.

Interior of Paddington Station. From painting of W. R. Frith, R. A.

The artist was paid £4500 for this work and £750 to waive his rights to exhibit in the Royal Academy. It was exhibited elsewhere, and in seven weeks 21,150 persons paid admission to see it.

piers, for instance, were 66 feet apart and carried up to within 35 feet of rail level. The track lay on three laminated beams, fastened together by bolts and joggles, these beams being supported on four struts of timber radiating from cast iron shoes on the tops of the masonry piers, iron tie rods being used for rigidity and the design being such that any defective timber could easily be replaced. The longest of them was 1120 feet and the highest 151 feet, both these being on the Cornish Main Line. With the exception of the Dare Viaduct and the Gamlyn Viaduct on the Dare Branch in South Wales, all of these timber viaducts have now been replaced in masonry or steel, but they stood up to their work under increasing loads for over 50 years and were some of the most graceful and efficient structures ever designed in timber. "Many of them were built on a curve and it is of record that Brunel considered that this characteristic increased their lateral stiffness."

When it came to the use of wrought iron in bridge work, Brunel was able to bring his marked mathematical ability to bear on the theoretical design of riveted girders whose properties were then largely unknown, and after checking his calculations by a series of full sized experiments, he soon found a form of iron girder that he standardized for railway spans up to 100 feet. He was also one of the first engineers who saw the advantages of carrying the track across bridges on the same ballast that was used on the rest of the line, in order to secure a uniform support for it.

Brunel's masterpiece in wrought iron is the Royal Albert Bridge at Saltash which was completed just before his death in 1859 at a cost of £225,000. This bridge crosses the river Tamar in Cornwall where the channel is 1100 feet wide and 70 feet deep. Its total length is 2290 feet, the two center spans being 455 feet each. The piers are masonry, the center one being 35 feet in diameter. On it are four octagonal cast iron columns, on these in turn are the arched piers carrying the ends of the main spans. Each of these consists of one large oval wrought iron tube, 16 feet 9 inches broad and 12 feet 3 inches high, in the form of an arch, a more economical use of material than Stephenson's tubular bridges over the Menai Straits, at Conway and at Montreal. On each side of the tube a chain is suspended fastened to the tube's ends, the curve of the tubes and chains being identical, the one being as high above as the other is below the abutments on the piers. Chains and tubes are connected by vertical members from which the floor is slung. The main spans weigh 1060 tons each. They were erected on shore, floated out into position and placed on the stone piers, the cast iron columns on the center pier and the masonry in the land piers being built up as the spans were raised to their designed height by jacks. This bridge is still in service, its floor system and wind bracing having been strengthened a short time ago to withstand the greatly increased loads of modern trains.

Among Brunel's tunnels the one at Box near Chippenham is probably the best known. It was successfully completed in 1841 in the face of great opposition and alarming prophesies as to failure, is 3212 yards long and ventilated by six shafts 30 feet in diameter. At the time of its completion it was by far the largest tunnel in existence and is an

excellent example of the fine architectural treatment with which Brunel embellished so much of his work, the good and plentiful building stone of this district enabling him to do so at small cost.

The bore of Brunel's tunnels, which on the original section of the line were all built for double track, were 30 feet broad and from 25 to 30 feet high, the top of embankments were 30 feet wide and the bottoms of cuttings were 38 to 40 feet. The two lines of track were placed at 13 feet center to center and no over bridge was less than 16 feet above rail level. These dimensions were colossal for the period, but they showed his great foresight and compare most favorably with the small scale on which Stephenson built, the latter's over all dimensions in tunnels and bridges seriously limiting the development of British rolling stock to this day.

Paddington Station, the London terminus of the line, is another instance of Brunel's farsightedness. Built in 1854 it was so much in advance of its time, that it took care of the growing traffic of the line for upwards of 50 years, no additions to the main structure itself being needed until 1909, when it became necessary to enlarge it, though the original building, one of the most spacious and comfortable stations in London, still remains in use.

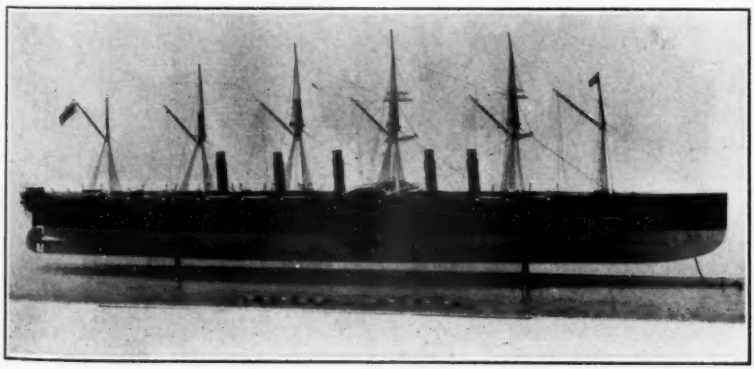
Before closing this very brief account of Brunel's professional life, mention should be made of his memorable achievements in steam navigation, for he turned with the same boldness, brilliance and competence to naval architecture that he showed in civil and mechanical engineering.

Three famous steam ships stand to his credit. The first of these was the "Great Western," a timber built paddle driven steamer of 2300 tons displacement, built in 1837. She was the first liner in regular transatlantic service, running between Bristol and New York from 1838 to 1846. She carried 152 passengers and earned a dividend of 9% in her first year, and was both technically and commercially a success. In 1847 she was sold to the West India trade, and was broken up in 1857.

The second of Brunel's ships was the "Great Britain" launched in 1843. She was built of wrought iron and embodied many new principles of construction such as water tight bulkheads, cellular construction in the hull, bilge keels, and screw propulsion, being a great advance over anything then afloat. Her tonnage was 3618, she carried 260 passengers and 1200 tons of cargo, and her best day's run was 287 miles. In 1846 she ran aground on the north east coast of Ireland on her way to New York, where she remained exposed to severe storms for 11 months. Brunel was able to salvage her by a clever construction of breakwaters, and when it was found on survey that her hull was in no way strained, she was repaired and sold to the Australia run where she remained in service for over thirty years. It was the design of this ship that brought about the invention of Naysmith's steam hammer, as it was originally proposed to drive her by paddles, and on account of its unprecedented size, no manufacturer would undertake the forging of her main shaft. Brunel suggested that Naysmith be consulted and he produced his steam hammer, though it was not used for this forging, as Brunel had in the meantime prevailed upon the ships owners to adopt a screw instead of paddles. The incident is interesting as showing the very close interplay of the leading engineers of the time, and the need of each for the other.

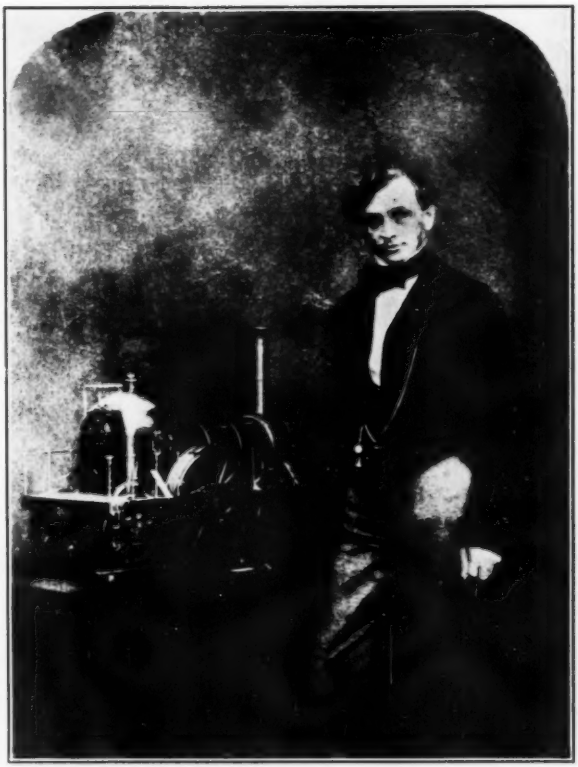
Courtesy Science Museum, South Kensington, London.

The S. S. "Great Western" on her maiden voyage.



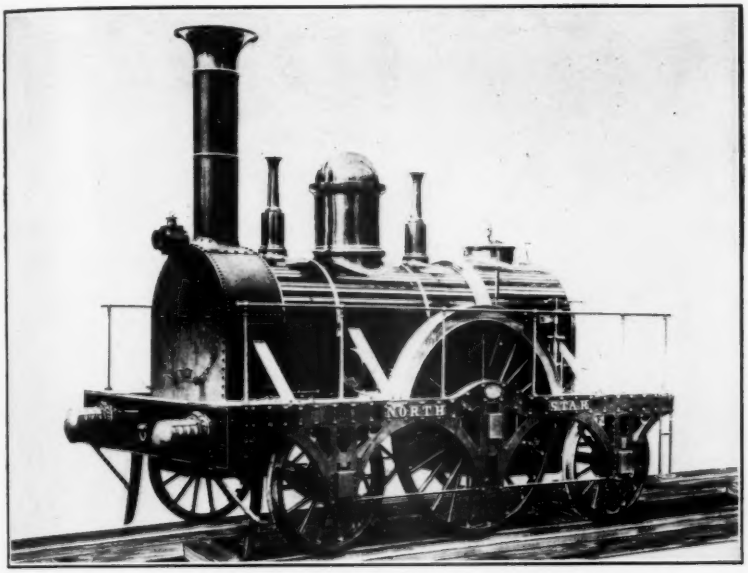
Courtesy Science Museum, South Kensington, London.

The S. S. "Great Eastern"—scale model in the Science Museum.



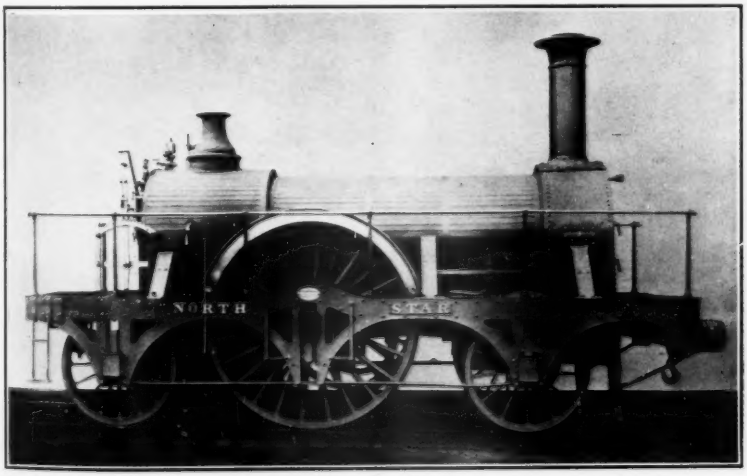
Daniel Gooch in 1845—age 29.

The locomotive is the "Ixion", one of Gooch's standard express class of 1840-42. This locomotive was used in the Gauge Commission tests.

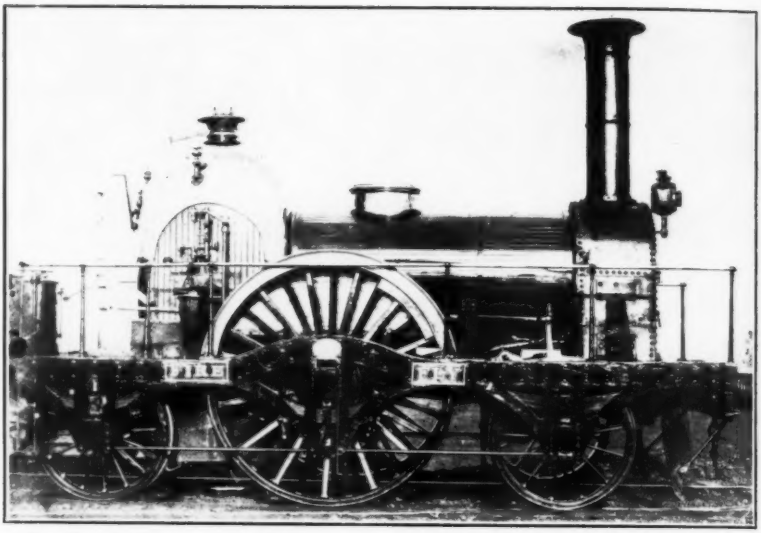


The "North Star" as delivered in 1837.

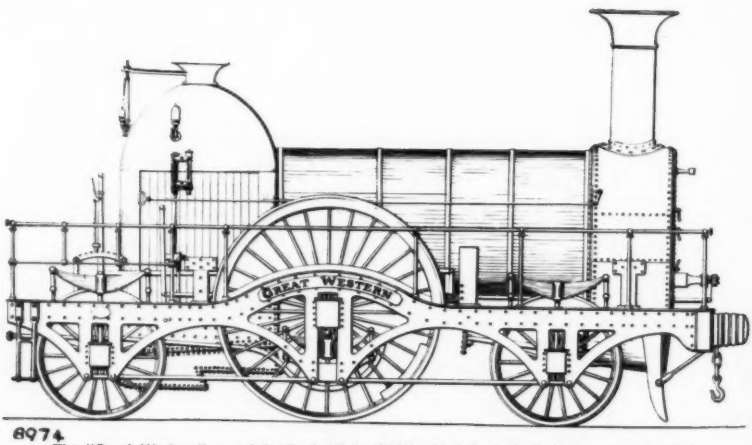
Photo cf the engine as reconstructed for the 1925 Railway Centenary Celebration. The driving wheels are the original ones supplied in 1837 - — note staggered spokes and absence of counter weights



The "North Star" as rebuilt in 1854.



The "Fire Fly". Note staggered spokes. Counter weights do not appear in the drawings reproduced by Warren but were fitted later.



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The "Great Western" as originally built in 1846. Sketch of E. T. Lane, reconstructed by G. F. Bird.

The third and the most famous of Brunel's ships was that eighth wonder of the world, the "Great Eastern," which for 40 years remained the largest vessel ever built, being only exceeded in size when the White Star "Oceanic" came out in 1899. The "Great Eastern" was launched in 1858. She was 679.5 feet between perpendiculars, had a beam of 83 feet, carried with ease over 3000 people, and displaced about 27,500 tons on a 30 foot draught. Her arrival in New York on June 28, 1860 caused great excitement, and though she was never a success commercially, and was broken up in 1888, her great role come in 1864, when she was chartered to lay the Anglo-American cable. In her hull Brunel had developed to a still further point the cellular construction he had used in the "Great Britain," and in spite of her length and the enormous cargoes she carried on these cable laying expeditions—on one of them she displaced 32,724 tons on a 34 foot 6 inch draught—she never developed the least signs of weakness in her hull, and as she was driven by both screw and paddles and was in consequence very easy to manoeuvre, a better cable laying ship could hardly have been designed.

Each of these ships represented a distinct step in the development of naval architecture, and while a technical account of their design and construction would be full of interest it cannot be included here; they are only mentioned to show Brunel's amazing versatility and the innate capacity of the man. There is no record of his equal in combining brilliance and boldness of conception, efficiency in design, facility in the use of materials and an artistic appreciation of structure as such. His breadth of interest was enormous, yet he took the greatest pride in the finish of his most detailed drawings; the scale of his work was immense, yet it was instinct with beauty, and proved that good engineering does not of necessity rule out this quality, on which he always laid stress.

A mere catalogue of his works, inventions and improvements in the technique of engineering would be wearisome, though a few can be listed to show the wide and imposing sweep of his genius. He was Chief Engineer to railways in India, Italy and Ireland. His dock and harbour work in England was noteworthy through his introduction of wrought iron in dock gates, which he made partially buoyant for ease of handling. His authoritative experiments on screw propulsion did as much as anything to break down the prejudice against this form of drive. The gear he used in the "Great Britain" between engine shaft and propeller shaft, was the forerunner of the reduction gear used to-day in turbine ships. His suggestions to Froude to study the behaviour of ships in waves led to the latter's ship model testing tanks, of fundamental importance to the naval architect of to-day. The problems presented by the Crimean War led to his design of a monitor embodying the elements of the modern turret; to his experiments in rifling in which he used a polygonal bore; to his invention of the wire wound gun; and to his designs for field hospitals, the principles of which were used in those built by the American Government during the Civil War and adopted as standard by the Germans in the Franco Prussian War. Even the common bolt did not escape him, for his invention of the "proud" bolt, where the shank retains its full strength as the threaded portion

is cut on an upset, adds but another item to the richness and variety of the legacy he left to mechanics; and "The Engineer," London, in what could well be part of his epitaph, writes of him as follows:

"In all that constitutes an engineer in the highest, fullest and best sense, Brunel had no contemporary, no predecessor. If he has no successor, let it be remembered that . . . the conditions which call such men into being no longer have any existence."

Such was the man who was to be Chief Engineer of the Great Western Railway.

Immediately on his appointment he proceeded with the surveys of the line, and after great opposition, Parliament eventually passed the Great Western Railway Bill on August 31st, 1835. He records in his diary: "The railway is now in progress. I am thus engineer of the finest work in England. A handsome salary, on excellent terms with my directors and all going smoothly. But what a fight we have had and how near defeat."

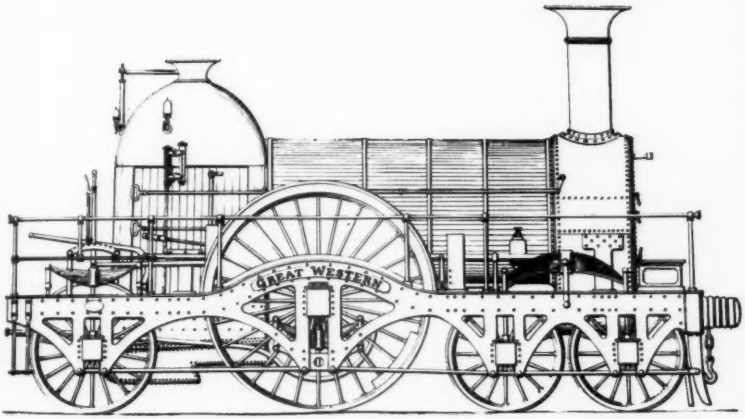
At an early stage he began to see the limitations that the Stephenson gauge of 4 feet 8½ inches would place on speed and the design of rolling stock, putting his point of view in the following words:

"Looking to the speed which I contemplated would be adopted on railways, and the masses to be moved, it seemed to me that the whole machine was too small for the work to be done, and that it required that the parts should be on a scale more commensurate with the mass and the velocity to be attained."

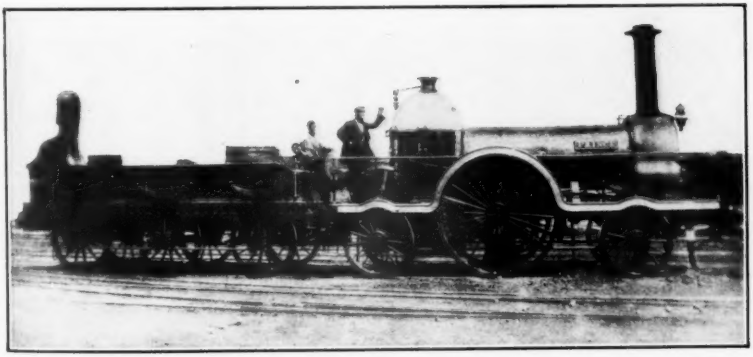
The easy nature of the country through which the new line was to pass was also a factor in the decision he arrived at in favour of a wide gauge, as with the exception of two short inclines of 1 in 100, he was able to keep the steepest gradients between London and Bristol as low as 1 in 660, long stretches of the line being practically dead level, and with these factors in mind he succeeded in persuading his Directors to adopt a gauge of 7 feet.

That this decision of Brunel's has been proved wrong by events is evident, but he was not alone in refusing to accept the purely adventitious gauge used by the Stephensons. Even in the latters own territory, the Liverpool and Manchester Railway just missed being laid to a gauge of 5 feet 6 inches by Rennie, and it is interesting to consider what would have been the effect on railway history had the designs of this engineer been carried out on so important a line. Through a disagreement with the Directors, however, he was superseded by the Stephensons at the last moment, and they are responsible for the unmechanical dimension now standard in most parts of the world. Spain, Ireland, Russia and India all officially adopted a wider gauge, and one has but to recall the gauge of the Erie, the Atlantic Great Western, lines in Missouri, in Texas and in the South, and those in Canada and Holland and even in the East of England and Scotland, to name but a few, to show the widespread disapproval of the Stephenson gauge by impartial engineering opinion.

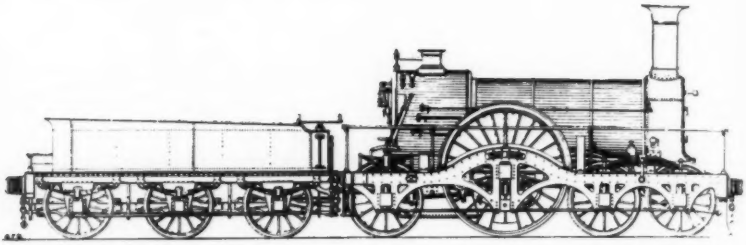
Brunel also disagreed with the Stephenson method of track laying. He saw the weakness of the stone blocks to which Stephenson fastened his rails and decided to use timber in place of them, but timber laid



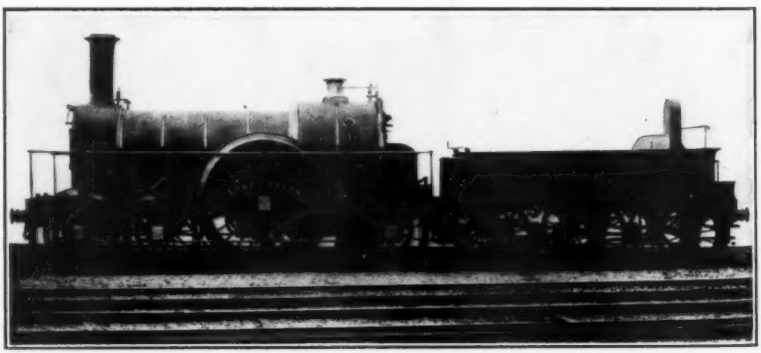
The "Great Western" as altered after her accident in 1846. Sketch of E. T. Lane, reconstructed by G. F. Bird.



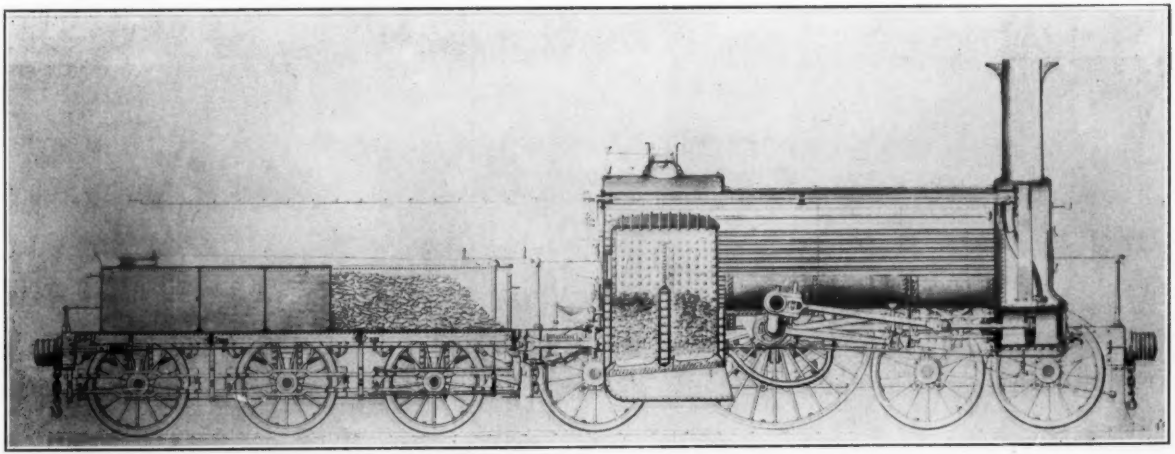
The "Prince," one of the six expresses built in 1847. This engine was one of the five fitted with 7 ft. drivers.



The "Iron Duke" as delivered in 1847. Sketch of E. T. Lane, reconstructed by G. F. Bird.

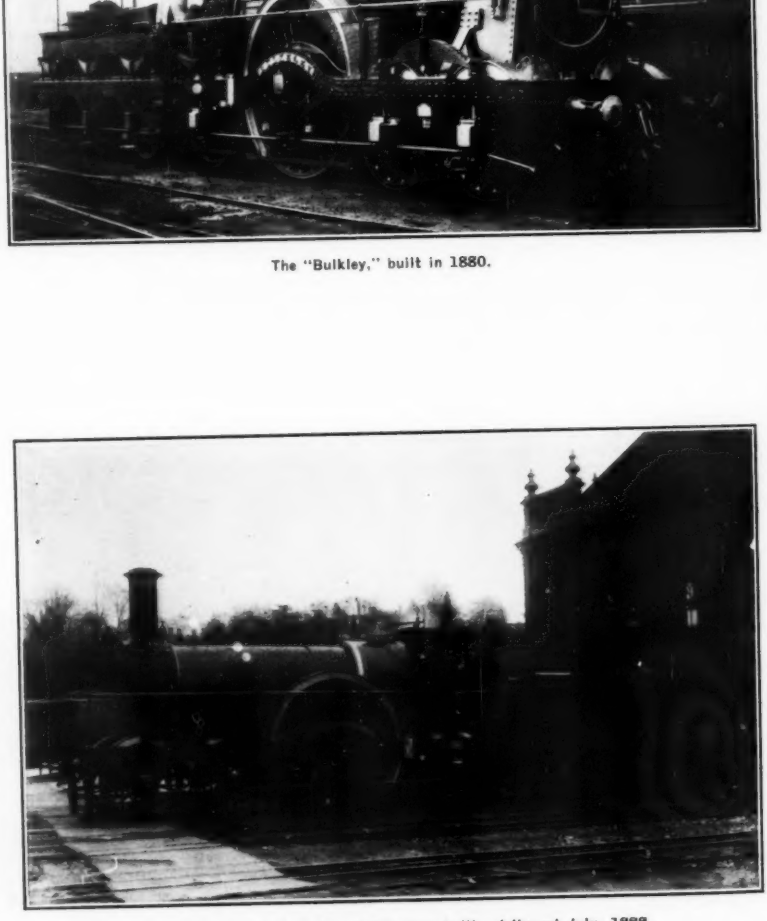


The "Lord of the Isles." This engine was exhibited at the Chicago Exposition—1893.



Sectional elevation of "Iron Duke" class.

The "Bulkley," built in 1880.



The "Tornado"—last engine of this class built—delivered July, 1888.

lengthwise with the rail to give it a continuous bearing, quoting the extensive use of this system in the United States in support of his plan, though in reality he was reverting to the earliest tramroad practice. In place of strap iron used in the States, however, or the T rail and chair used by Stephenson, he designed the so-called "bridge" rail, with a section in the form of an inverted U, the first rails supplied weighing 43 pounds to the yard. The longitudinal sleepers of his road were connected at intervals by transoms, so that the track was in the form of a gigantic ladder. In the earlier portions of the line the longitudinals were 5x12 inches, but later on they were increased in size to 7x14 inches, and they were canted at an angle of 1 in 20, the same angle as is used to-day in rail cant and wheel coning.

It is interesting to note that he fell into the same error as early American engineers in believing that he would have to anchor his track to the earth. This he did by driving piles at intervals and bolting them to the transoms, but they were soon found to be a mistake and were done away with.

This type of road became noted for its smoothness and quietness and remained standard until the abolition of the broad gauge, and even afterwards was used for some time on those last portions of the line to be converted to narrow gauge. Lengths of it can still be found in out of the way sidings even now. In comparing the two systems of track it is interesting to record, however, that at the time of the conversion there were about 35 miles of broad gauge cross tie road in use, and engine drivers claimed they were able to handle two more coaches to a train on this piece of line than on the longitudinal sleepers. As axle loads got heavier it also developed a weakness for though the weight of rails had been increased to 75 pounds to the yard, they were crushed into the timbers, and the timbers themselves often showed a tendency to open out like a book so that thin wedge shaped layers of hard wood—with a cant of 1 in 20 and with the grain crosswise to timbers and rails—were placed between the rails and the timbers, no cant being provided in the latter. It may be remarked in passing that derailments were practically unknown on the broad gauge, though they were common enough in early days on the narrow.

The high water mark of the 7 foot gauge was reached in 1867 when there were about 700 locomotives and some 1500 miles of it in operation, though nearly 380 miles of mixed gauge was already included in this total. From the very first it had to meet the strong opposition of the narrow gauge supporters, and by 1845 the question had become so acute that the Government of the day appointed the famous Gauge Commission to report on the matter. This body eventually recommended that the Stephenson gauge be fixed as standard for the Kingdom, but excerpts from its findings show that it appreciated the advantages of the broad gauge and Brunel's reasons for adopting it. The Commission wrote:

"We feel it a duty to observe here that the public are mainly indebted for the present rate of speed and the increased accommodation of railway carriages to the genius of Mr. Brunel and the liberality of the Great Western Railway."

"On the broad gauge the motion is generally more easy at high speed."

"In respect of speed we consider that the advantages are with the broad gauge."

Having established the type of track to his satisfaction, Brunel, in order to secure the speed for which he contended, took a particular interest in the general design of the locomotives to be ordered for the line, and issued a series of instructions or recommendations to locomotive builders. These instructions were the cause of a great deal of criticism, as they resulted in the delivery of a series of thoroughly unsatisfactory engines, and Brunel cannot be absolved from the responsibility for the failure of these machines. While in the main his instructions were sound enough, he had laid down a condition as to piston speed that made it well nigh impossible for the builders to supply practical engines. Whether he did so in ignorance of current narrow gauge practice or through bad advice it is now difficult to determine, but the fact remains he stipulated a piston speed not to exceed 280 feet per minute at 30 miles per hour, a requirement the manufacturers met by building engines with enormous drivers, very short stroke cylinders and very small boilers. In two cases they even built articulated engines, with the boiler on one carriage, the engine on another and the tender on a third. One of these had a pair of 10 foot drivers with cylinders only 16x20 inches, the other had 4 coupled 6 foot wheels driven by cylinders of the same size, but through a system of gears on a ratio that made the drivers equivalent to wheels over 16 feet in diameter. Needless to say these two engines had practically no tractive power and were useless for ordinary traffic, though they were capable of running light at great speed.

Brunel did his best to correct this unfortunate situation by the appointment on August 18th, 1837, of Daniel Gooch as Locomotive Superintendent, placing him in full charge of the locomotive department.

Gooch was not yet 21 when he was given this important post, having been born on August 24th, 1814, at Bedlington, Northumberland, where his father was employed in the Bedlington Iron Works. George Stephenson was a friend of the Gooch family and as young Gooch soon showed a distinct bent towards mechanics, this friendship was of value to him, as at 18 he went to work in the shops of the Vulcan Foundry—one of the largest locomotive works in the country to-day—which Robert Stephenson and his partner Tayleur were just finishing, and later joined Stephenson's equally famous locomotive works in Newcastle. This early training under the Stephenson régime influenced the whole of Gooch's locomotive practice on the Great Western Railway, so that engines embodying Stephenson characteristics of design ran on the line of his great professional rival right up to the abolition of the broad gauge.

Gooch has left very full diaries, or rather reminiscences, for prior to 1866 the entries seem obviously written from memory, and these show that during 1836, while he was draughtsman at the Stephenson Newcastle works, the firm was building some engines for a Russian railway with a 6 foot gauge, as well as two for the New Orleans Railway with a gauge of 5 foot 6 inches. These two orders were for locomotives of the typical 2-2-2 outside framed inside connected construction which Stephenson had patented in 1833, and it is probable that Gooch worked on the drawings of both. His signature on the drawings of the Russian

engines proves that he did so in this case, but he is in error in writing in his diaries that they were not delivered to Russia, but were bought and altered for service on the Great Western Railway. Warren points out conclusively in his "Century of Locomotive Building," that it was the two New Orleans locomotives that were left on Stephenson's hands as a result of the panic in the United States during 1837. It was these engines that were acquired by the Great Western Railway before Gooch's appointment, their axles were lengthened for the wider gauge, and in place of the 6 foot 6 inch driving wheels with which they were first built, a pair of 7 foot wheels was fitted to one of them, the famous "North Star."

This engine was delivered on November 28th, 1837, and her appearance in her original condition is shown in the illustration. Her frames measured 21 feet 9 inches over all, her wheelbase being 13 feet 4 inches. The leading and trailing wheels were 4 feet in diameter, the cylinders 16x16 inches, and the drivers 7 feet. The boiler had a length of 8 feet 6 inches with a diameter of 4 feet, the tube heating surface being 639.94 square feet, and that of the firebox 66.62 square feet, with a grate area of 13.6 square feet. Her weight in working order was about 21 tons, these dimensions being considerably greater than the average for a standard gauge Stephenson six-wheeled engine of 1833-40.

"North Star" was a success from the start. Gooch writes of her as one of the few engines on which he could rely, and Brunel, showing the importance he attached to the appearance of a locomotive, wrote to a correspondent:

"Lastly let me call your attention to the appearance—we have a splendid engine of Stephenson's, it would be a beautiful ornament in the most elegant drawing room and we have another of Quaker-like simplicity carried even to shabbiness but very possibly as good an engine, but the difference in the care bestowed by the engine man, the favour in which it is held by others and even oneself, not to mention the public, is striking. . . . Now your engine is capable of being made very handsome, and it ought to be so."

On a trial trip with a train carrying 200 passengers, "North Star" did 22½ miles in 47 minutes, or at a rate of 28 miles an hour; she also drew a load of 110½ tons including engine and tender at 30½ miles an hour, and with 45 tons made an average of 38½ miles an hour with a maximum of 45. She cost £2,150 and can be considered as Great Western Railway No. 1, as she drew the first passenger train. In 1854 she was rebuilt at Swindon, her wheelbase being lengthened one foot, new cylinders 16x18 and an enlarged domeless boiler with raised firebox casing being fitted. She was in service until December 1870, having run 429,000 miles, being then stored at Swindon until 1906, when she was scrapped.

Because of the chaos in the locomotive department due to the first unsatisfactory engines, Gooch was instructed very shortly after his appointment to prepare complete drawings and specifications for future locomotives, and to see that they were built with strict regard to his drawings. He took great pains with these designs—his chief draughtsman being Thomas Russell Crampton, later famous as designer of the

Crampton type locomotive. The drawings were lithographed and the specifications printed, and sheet iron templates were made for those parts which Gooch decided should be interchangeable, he being the first locomotive superintendent to establish such a system of standard interchangeable parts.

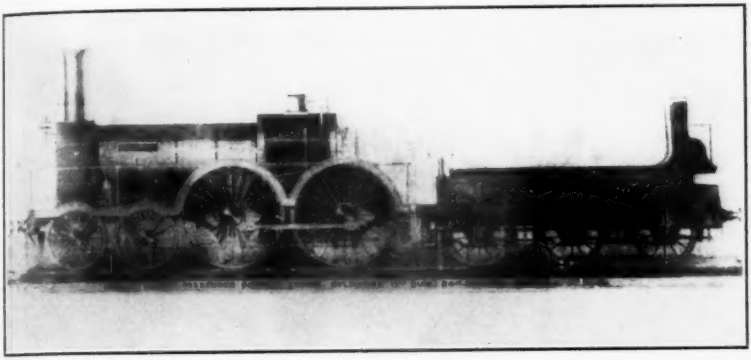
Before Gooch was able to bring these standards into effect, ten additional engines of the "North Star" class were ordered, generally similar to this engine but differing among themselves in several dimensions. As this class was the prototype of Gooch's standard engines, a description of the Stephenson system of construction on which they were all built may be of interest, as it is from the date of delivery of "North Star" that it is proposed to begin these notes on Great Western passenger engines, the earlier machines being so unsatisfactory that a description of them would be of little value.

The most noticeable detail in all these engines is the outside framing, which were so-called sandwich frames, consisting of oak or ash planking some three inches thick, to each side of which an iron plate ½ inch thick was bolted. The triangular openings were slotted out to lighten the structure, and this type of framing continued to be used on the Great Western Railway long after it had been given up elsewhere. The late E. L. Ahrons, the great authority on early British locomotive history, and an old Great Western engine driver, says that the retention of the Stephenson type of frame was due to the longitudinal sleeper road. He writes: "It is an undeniable fact to which the writer can testify from considerable experience on the footplates of both sandwich and solid plate framed engines, that the former ran much more smoothly and with less vibration on the longitudinal sleeper road. The difference was extremely marked and was even noticeable, though to a considerably less extent, on the ordinary cross sleeper road. The "baulk" road, as the drivers used to term it, was very "dead." For this reason the Great Western also used longer springs than other companies, and many of them were of the "open plate" type, in which each long main plate was separated from the one next to it by a short thin plate."

As well as this outside frame there were four inside frames in the form of wrought iron slabs, bolted to the cylinders in front and to the firebox sheet at the back; they were more in the nature of center stays for the crank axle than frames. The crank axle thus had six bearings.

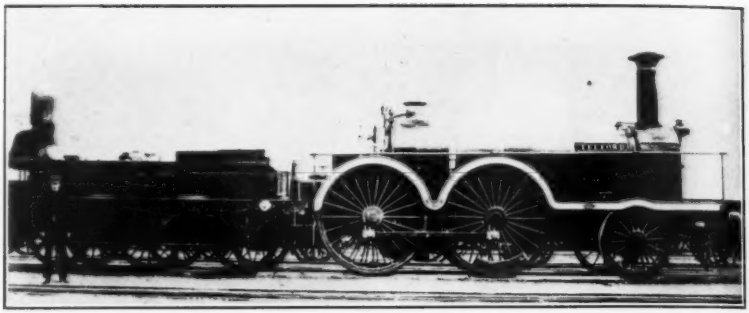
A so-called Gothic or haystack type of firebox was used by Gooch in these standard engines, a practice he continued until about 1850. The boiler pressure was 50 pounds to the square inch, the heating surface was 699 square feet, with a grate area of 13.5 square feet, the wheel diameters were the same as those of "North Star," though the wheelbase was only 13 feet 2 inches. The 7 foot drivers were a foot larger than any then used on the narrow gauge and they were flanged, "North Star" having blind tires. The cylinders were 15x18; in later years they were enlarged to 16x20.

Gooch's final specifications for these standard engines, dated September 1840, are of great historical interest, as they show the care he took over the details of the designs and the amazing grasp he had of

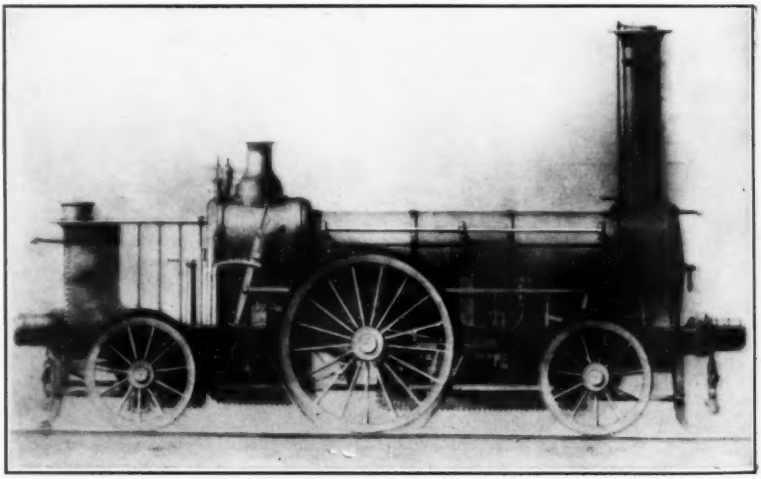


The "Waverley" of the Rob Roy class—1855. Photo from an early drawing—color washed.

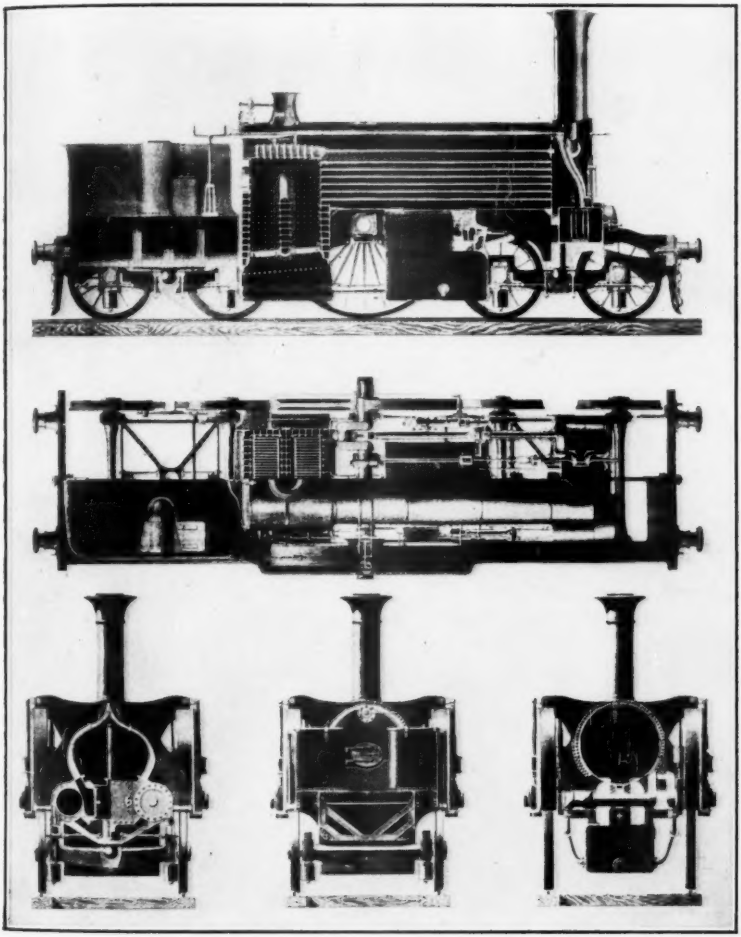
The "Antiquary," one of the Rob Roy class in service.



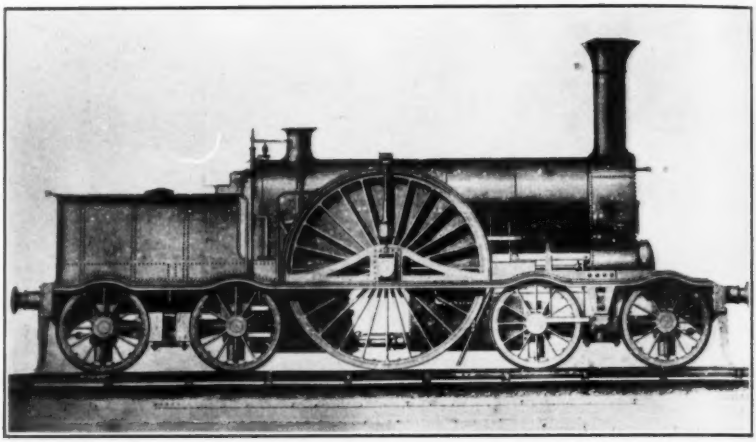
The "Telford," one of the last passenger class designed by Gooch in 1856.



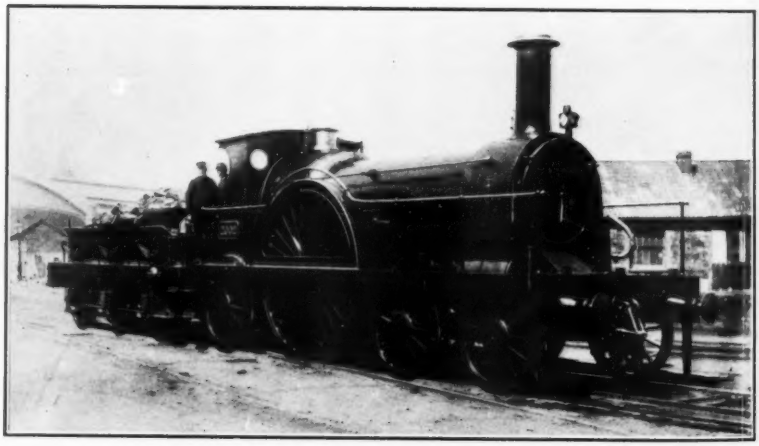
Pearson's first design of 2-2-2 tank engine, 1851.



Sectional elevations of Pearson's 4-2-4 express tank engines. Note fine quality of these drawings.



Pearson's 4-2-4 express passenger tank engine—1853. From an early color washed drawing.



Armstrong's rebuild of Pearson's third class of 4-2-4 express passenger tank engines of 1866-1873.

practical locomotive work at the age of 24. The connecting rods, for instance, had their oil cups forged solid with them, all pins and eyes in the valve motion were case hardened, and the suppliers were to be responsible for all defects developed during the first thousand miles run, this provision being still customary in British practice.

There were 105 six wheeled engines built to these standards during the years 1840-42, 62 of which were passenger engines with 7 foot drivers, the first to be delivered being "Firefly". She arrived in March 1840 and the last in December 1842. The whole lot had been scrapped by 1879, some of them having been rebuilt similar to the rebuilding of "North Star." These engines burned coke—coal not coming into use until about 1860—and were very extravagant in fuel. As a result of tests, Gooch found that by altering the exhaust nozzle and increasing the lap on the slide valves he was able to greatly improve the original consumption figures which had varied from 40.6 to 71.6 pounds per mile.

He also developed and patented a process for steeling the treads of tires, as the usual wrought iron tires of the period showed excessive wear. His new tires were adopted as standard and were so hard that they had to be ground, as no tool would cut them. Many of them showed a life of more than 200,000 miles. In 1843 he also invented his stationary link motion which was fitted to most of the broad gauge engines. It is a gear of the constant lead type, and became very popular on the Continent. It differed from the Stephenson gear in that the link curved in the reverse direction, and its arc was equal to the length of the radius rod. It was suspended about its center, and the die block was moved up and down in the link by the reverse lever.

During 1845 the Gauge Commission began its hearings, which at times became very heated and were interlarded with the most ridiculous questions and testimony. Brunel was impressed with the amount of time the Commission gave to the question of locomotive efficiency, and suggested that tests be carried out by locomotives, on both gauges, as he felt confident about what Gooch's machines could do.

Gooch selected one of his standard engines the "Ixion,"—bored out her cylinders to 15¾ inches and raised the boiler pressure to 75 pounds per square inch. With a load of 60 tons this engine reached a maximum of 61 miles per hour and an average of 53.9, 52 miles being covered in 57.55 minutes. The best narrow gauge result was a maximum of 53¾ miles per hour with a load of 50 tons. These tests did not affect the ultimate findings of the Commission, but showed what the broad gauge could do in spite of some pretty sharp practice during the tests on the part of the narrow gauge supporters. An interim report was issued stating: "We consider them (i.e. the trials) as confirming the statements and results given by Mr. Gooch in his evidence, proving, as they do, that the broad gauge engines possess greater capabilities for speed with equal loads, and, generally speaking, of propelling greater loads with equal speeds; and moreover that the working of such engines is economical where very high speeds are required, or where the loads to be conveyed are such as to require the full power of the engine."

As Gooch saw that the gauge controversy was likely to continue and that the results of the tests, in spite of the favourable interim report, had not fully justified the claims of the broad gauge, he decided to design a locomotive that would leave no question as to its superiority.

His "Great Western" was the result, a remarkable engine in every way considering the date of its construction. It was built in the new works which he had laid down at Swindon, and delivered in April 1846, 13 weeks after the order had been placed, work being carried on day and night. He had no time to prepare detailed drawings, a few center line drawings and rough sketches being used. She was an enormous advance over any of his previous designs both in size and appearance. The wheel-base was 16 feet, the leaders and trailers were 4 feet 6 inches, the cylinders being 18x24 and the driving wheels 8 feet. The frames were 24 feet 1½ inches long and the boiler was very large, with a pressure of 100 pounds per square inch, and a heating surface of 1733.21 square feet, 151 square feet being provided by the firebox, which had a grate area of 22.64 square feet. Her weight was 29 long tons empty.

These dimensions were far larger than anything then in existence and her performance was exceptional. On June 1st 1846, she ran from London to Exeter, 194 miles in 208 minutes, exclusive of stops, and took 100 tons from London to Swindon, 77¼ miles, in 78 minutes. While she was an unqualified success in service, her leading axle broke while running at high speed and it was decided to lengthen her frames and fit two pairs of smaller carrying wheels at the forward end in place of the single pair with which she was built. In this form she ran until 1870 completing 307,687 miles, and was then scrapped.

Gooch decided to give "Great Western" a thorough trial before building others of a similar type, but as power was needed, he turned out six smaller engines of the 2-2-2 type with inside frames, 5 of them with 7 foot drivers and one with 7 foot 6 inch wheels. They had 16x24 inch cylinders and a wheelbase of 14 feet 10 inches. The weight in working order was 26.2 long tons, with 11.5 tons on the drivers. They were delivered before April 1847, and had all been scrapped by 1870.

This class was immediately followed by an improved "Great Western," the celebrated "Iron Duke," exceeding once more in size and power, and in beauty of design, any locomotive then in existence. It was the first of a class of six, all built in 1847, and with but few modifications this type continued to be the standard express locomotive until the abolition of the broad gauge, batches being built from time to time right up to 1888.

In these new engines Gooch discarded the haystack type of firebox and used a domeless boiler with a raised firebox casing, steam being collected in a perforated pipe extending the whole length of the boiler and ending in a slide valve regulator in the smokebox, this arrangement being highly successful. There was no foundation ring to the firebox, the inside sheets being bent out to meet the casing, the sheets being secured by two rows of rivets. A mid-feather was used in the firebox and a system of draft regulators was fitted over the smokebox tube plate, worked by a rod extending back to the boiler head. The boiler was very

large for the period. It had a barrel 11 feet long by 4 feet 4¾ inches in diameter, and its center line was 7 feet 2 inches above rail level . A pressure of 100 pounds per square inch was used at first, increased to 115 pounds later on. There were 1944.99 square feet of heating surface, the firebox with a grate area of 22.66 square feet, providing 147.87 square feet of this total.

Outside sandwich frames were used, with outside bearings to all wheels. The crank axle had three inside bearings as well, one in each of the customary inside frames and one in a central axle box whose guide was riveted to the underside of the boiler. The cylinders were 18x24 and they were fitted with balanced slide valves, consisting of two small pistons in the common steam chest, these being attached to the backs of the valves by short links, the cylinders in which these pistons worked being open at their further ends to the exhaust. This scheme worked well when new, but soon became noisy, and as the wear on the pistons soon allowed leakage and consequent loss of balance, unbalanced valves were afterwards substituted.

The engine was carried on eight wheels in a rigid wheel base of 18 feet 6 inches, the driver being 8 feet in diameter, with flangeless tires and counterbalances, the carrying wheels being 4 feet 6 inches. No brakes were fitted to the engine itself. A species of equalizer was provided by the single pair of inverted springs at the front end, which took the load on both the forward axles. In working order "Iron Duke" weighed 35 tons 10 cwt., the leading wheels carrying 14 tons 4 cwt., the drivers 12 tons 6 cwt., and the trailers 9 tons. An iron framed tender carried on six 4 foot wheels was originally provided, with a wheel base of 15 feet. It had a tank capacity of 1800 gallons and carried a ton and a half of coke, though a few years later tenders with sandwich frames like those on the engine were built, and later still the tank capacity was enlarged to 2700 gallons. The tender wheels were braked; though as delivered, brake blocks were only fitted to the left hand wheels.

"Iron Duke" was followed by sixteen similar engines built at Swindon between June 1848 and March 1851, among them the famous "Lord of the Isles." In this batch the firebox heating surface was enlarged to 162 square feet and the grate area to 25.47 square feet, the tube heating surface being slightly less than before. The wheelbase was lengthened by 2½ inches, and they were the first Great Western engines to have the wooden lagging of the boilers covered with sheet iron, which was held in place by brass bands.

The frames and springs of all these engines and tenders were painted a reddish brown, the boilers and tender tanks being green. The stack had a copper top and the safety valve casing was polished brass, matching the brass bands around the boilers and the splashers around the wheels. The front buffer beam was painted a brilliant red, the axle boxes were polished brass and the cylinder heads and hand rails polished steel. The wheels, smokebox, tool boxes and guards seat were black, and as the engines were kept in spotless condition, they made an imposing and beautiful picture.

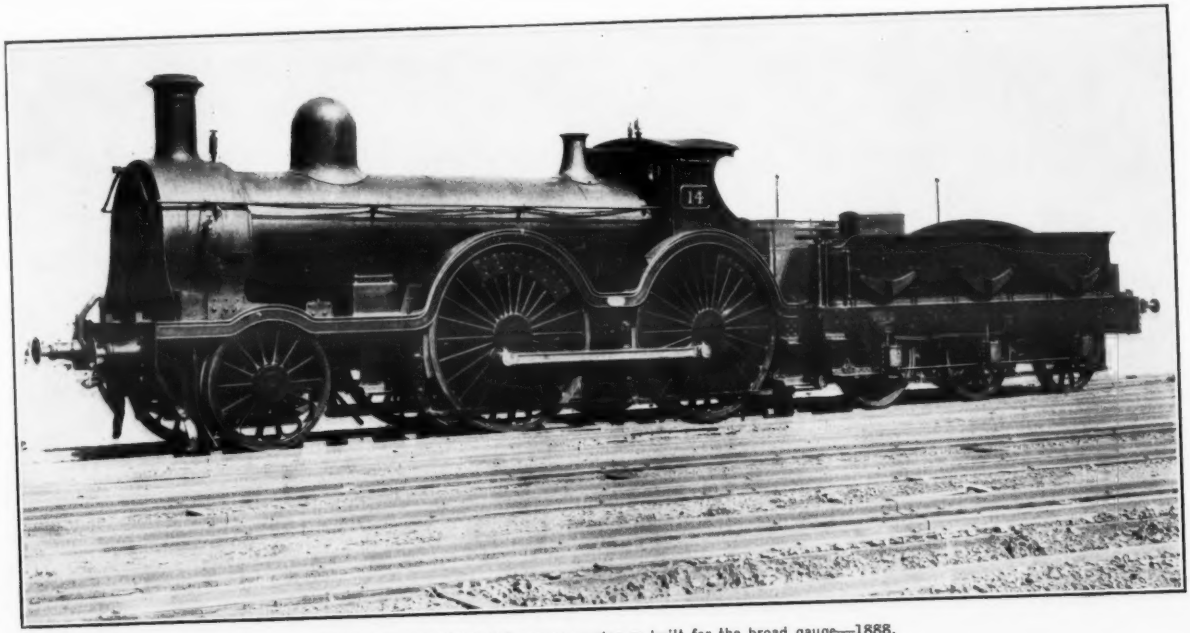
"Lord of the Isles" was shown at the Great Exposition in London in 1851, started work in June 1852, and ran with its original boiler until June 1884, completing 789,300 miles. Many members will remember seeing this famous engine with its train at Chicago in 1893. From 1884 to 1906, with the exception of an occasional visit to an exposition, it was stored at Swindon with its stable companion "North Star." In 1906 these two engines, the only broad gauge expresses in existence, were broken up by the late G. J. Churchward, the then locomotive superintendent of the Great Western Railway, because the shed in which they were stored was needed for other purposes. In fairness to Churchward, who was responsible for this inexcusable vandalism, and acted in the ignorance of and without the authority of the Board of Directors, it should be mentioned that the engines had been offered to the South Kensington Science Museum, to the Swindon Mechanics Institute, and to the town of Swindon itself, before it was decided to scrap them. With singular lack of foresight and historic sense, these three bodies refused to accept them unless the Great Western Railway made a grant for their maintenance.

A few parts of them were preserved, and when it was decided by the Great Western in collaboration with Robert Stephenson & Company, now of Darlington, to reconstruct "North Star" in the form in which she was originally delivered in 1837, for the Railway Centenary celebrations in 1925, the parts belonging to her were used in the construction of her replica, which members will recall having seen at the Baltimore & Ohio Centenary at Halethorpe in 1927; the old engine, at least in part, having at last arrived in the country for which she had originally been intended some ninety years before.

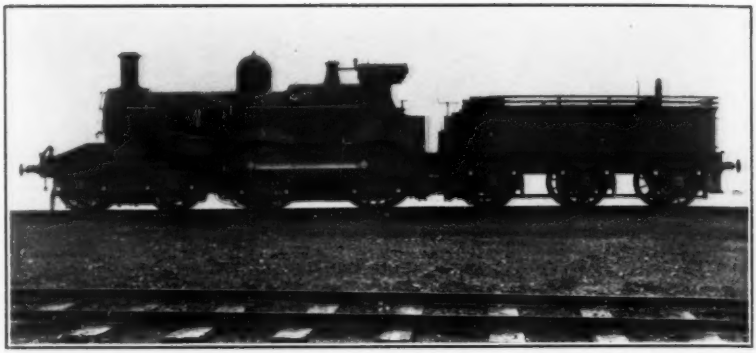
Ahrons states that there were thirty of these 8 foot singles including "Great Western," and that in 1892 three of them were still at work, rebuilt, and containing parts of the originals. The others had been scrapped and replaced by entirely new engines. The wheelbase had been increased to 19 feet, the boiler pressure to 140 pounds per square inch, and the weight to nearly 42 long tons, with 16 tons on the drivers, which had flanges after 1871. Cabs were fitted after 1873. Eight years later three more were delivered, these being fitted with the largest boilers built for the broad gauge; the heating surface was 2084 square feet and the grate area 24 square feet. "Tornado," was the last of the class. She went into service in July 1888.

With one exception to be mentioned later, these famous engines were the most interesting express class on the Great Western. Under test with a dynamometer car which Gooch designed for the purpose—the first one of its kind—they showed a maximum speed of 78.2 miles per hour, and were used on the fastest expresses until the end of the broad gauge. With the light trains then customary, they made a very good showing in operation and maintenance, and after the adoption of coal as fuel in 1860, their consumption varied from 24 to 28 pounds per mile.

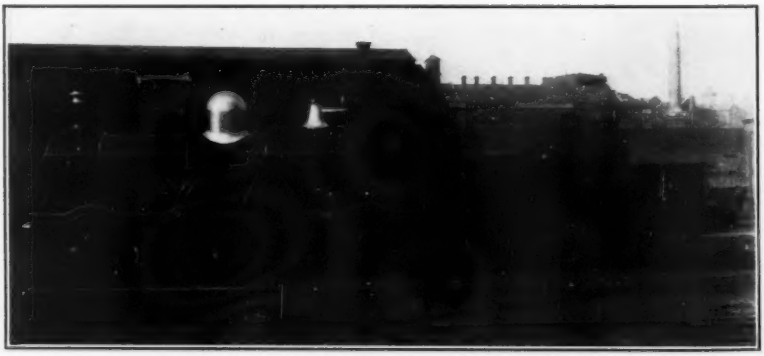
Ten four coupled express engines were built at Swindon in 1855. They were known as the "Rob Roy" or "Lalla Rookh" class and had 17x24 inch cylinders, 7 foot coupled wheels—the largest then in use in



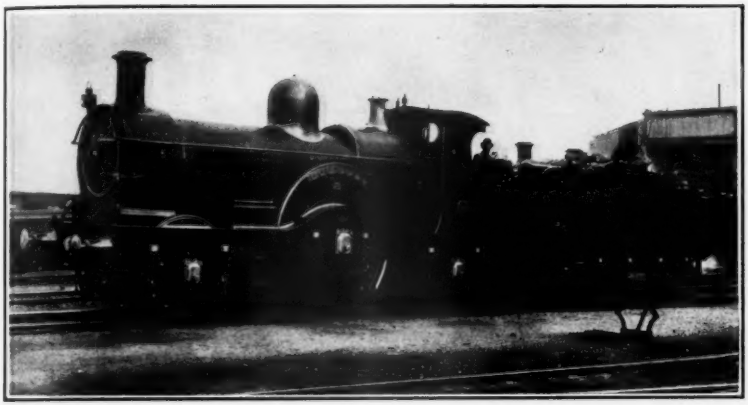
Dean's "convertible" 2-4-0 express engine as built for the broad gauge—1888.



The preceding engine as altered for standard gauge.

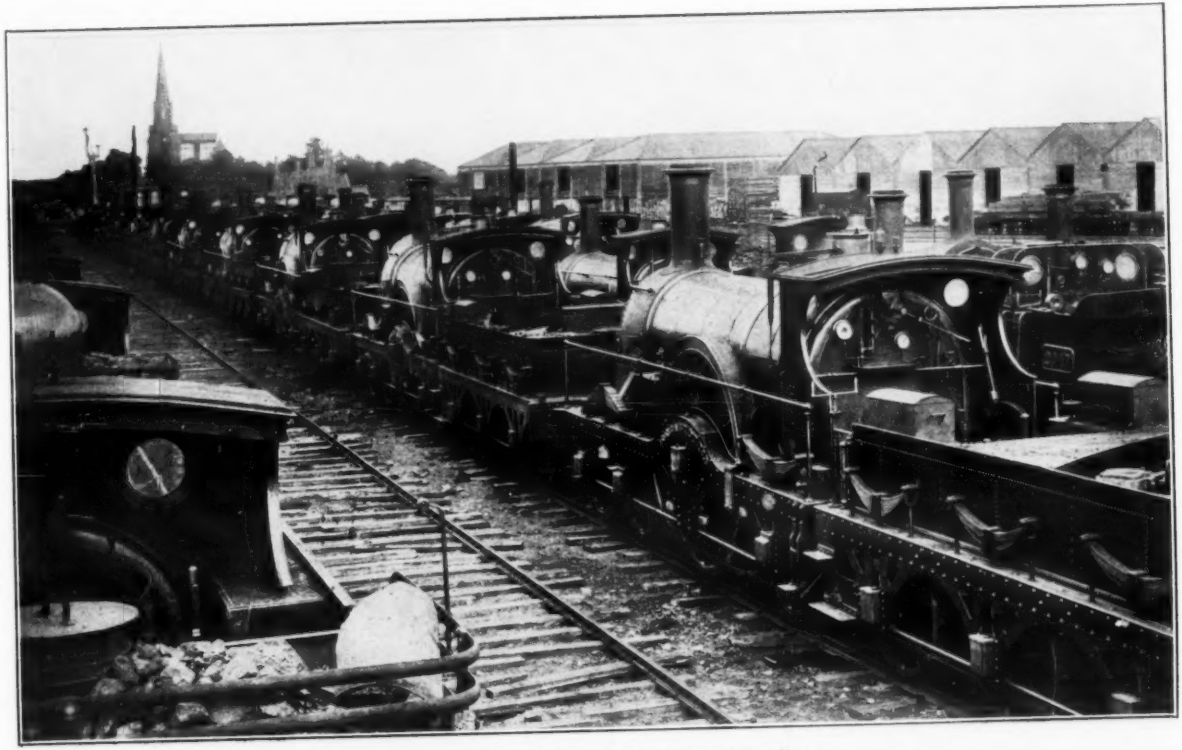


Dean's "convertible" 2-2-2 express engines as built for broad gauge—1891.



Dean's 2-2-2 rebuilt to standard gauge.

Dean's 2-2-2, rebuilt to 4-2-2 with domeless boiler.



Sidings at Swindon with discarded broad gauge locomotives.

England for coupled machines—and weighed 37 tons 5 cwt., with 22 tons on the drivers. They were never famous for speed, but did well on the heavier passenger trains, and after completing an average mileage of 500,000, they were all scrapped before 1876. Sandwich frames were used, but as will be noticed they were inside the wheels.

Gooch's last passenger engines consisted of a class of eighteen 2-4-0 machines with 16x24 inch cylinders and 6 foot 6 inch coupled wheels. They had a weight of 30 tons 13 cwt., with 20 tons on the drivers. The first came out in 1856 and the last in 1864. These engines were peculiar in being fitted with equalizers between all three axles, and they were originally furnished with four wheeled tenders.

In 1864 Gooch resigned as Locomotive Superintendent, and with him went the prospects of any further development of locomotive design on the broad gauge, for his successor, Joseph Armstrong, was chiefly occupied in building locomotives for the rapidly growing narrow gauge mileage of the company. Furthermore in 1866 Gooch, who was made a Baronet in that year, became Chairman of the Great Western at a critical moment in its financial history, and was obliged to initiate a very strict policy of economy. He was able to put the affairs of the company in a sound position in a few years, but his conservatism and the heavy reduction in train mileage on which he insisted, affected all the activities of the line, the locomotive department so far as broad gauge matters went, feeling this particularly.

There is no doubt that Gooch was one of the great figures of his age. His reputation is secure on many counts. The energy with which he collaborated with Cyrus Field in laying the first Anglo-American cable, using the "Great Eastern" for the purpose; his great part in making a success of the railway tunnel under the River Severn in the face of enormous difficulties; his founding the town of Swindon and the extensive works there; his belief in and consistent support of Brunel on the gauge question, as well as his inventions and mechanical improvements, are sufficient facts to prove this.

On the other hand it is equally true that in spite of the excellence of his early training, and the boldness and success of his first locomotive designs, the great promise of his youth as a locomotive designer was not fulfilled in his maturity. After 1847 when, taking existing engineering technique into consideration, he did produce an outstanding express engine, nothing followed in later years in any way comparable to the rapid growth in engineering practice, or in fact that took advantage of the broad gauge in design or in mere size, and the strict control he exercised over Swindon from his office in Paddington Station, where he went into every detail of the locomotive department, kept Armstrong as it were in apron strings, for Gooch never seemed able to allow his successor the same freedom and responsibility he had himself enjoyed when he first joined the company as Locomotive Superintendent. Due largely to this supervision, and to the policy of reduction of train mileage which has been mentioned, Armstrong turned out only one broad gauge express class of interest during his superintendency of

some 13 years, and it is to another locomotive superintendent that one must look for the most interesting and remarkable express engine ever designed for the broad gauge.

An independent company had built the Bristol and Exeter Railway to the 7 foot gauge, and it started work in May, 1849, with 20 passenger engines which Gooch designed as a smaller edition of the "Lord of the Isles" class, with 16½x24 cylinders and 7 foot 6 inch drivers.

In 1850 the company appointed its own locomotive superintendent, James Pearson, and the first engines he designed were 5 small 2-2-2 tanks, with 5 foot 6 inch drivers and 12½x18 inch cylinders. These came out in 1851. They were followed in 1859 by two larger ones of the same type, the cylinders being 14½x24. The finely designed details, particularly of the latter two, will be noticed.

In 1853 came Pearson's masterpieces, far and away the boldest and most individual locomotives that ever ran on the broad gauge. These were his unique 4-2-4 express tank engines, eight of which were built by Rothwell & Company, of Bolton, during 1853-54. The wheel formation is most unusual, but nothing could be chosen more suitable for high speed work. Two trucks were used, each having wheels 4 feet in diameter, on a wheel base of 5 feet 9 inches, the trucks working on a fixed ball and socket pivot. The front truck was provided with side roller bearings in the form of small grooved wheels running on the truck side frames. The housings of these wheels were secured to the center pivot casting by jointed rods, projections on the outside face of these housings working in small vertical guides, india rubber pads being fitted between the wheel housings and the main engine frames.

Both front and rear trucks were held in alignment by an interesting form of spring control. This consisted of two rods and two india rubber disk springs to each truck. The disk springs were housed in cups that bore against the center of the inner sides of the truck cross frames. The rods passed through these springs and cups and cross frames on the center line of the engine and were pivoted at their outer ends. A predetermined tension was secured by the customary washer and nut on the spring end of the rods, any radial movement of the truck immediately increasing this. The only brake rigging on the engine was fitted to the rear truck and was hand operated.

The total wheelbase was 24 feet 9 inches, and the single pair of 9 foot driving wheels, without flanges or counterbalances, was placed exactly at its center. In spite of this symmetrical arrangement, these engines ran with remarkable steadiness, and when new attained a maximum speed of 81.8 miles per hour under careful test, which remained a record in locomotive speeds for many years.

As will be seen, the entire spring system of these engines was india rubber. There was a separate rubber pad for each truck wheel, and the peculiar method of loading the inside and outside bearings of the driving wheels will be noticed. It consisted of equalizers passing over the wheels, and pivoted in the saddle or gusset plates attached to the boiler, the length of the equalizer arms being proportional to the load on the inside and outside bearings, which were of different diameters. Springs

in the form of disks of india rubber, separated by shallow iron cups, were enclosed in the two upright casings shown over the outside and inside bearings, the weight being transmitted to the bearings by the two pillars passing through the casings and into recesses in the rods forming their upper ends, these being pivoted to the equalizer arms.

The wrought iron driving wheels were superb examples of hand forging and show the great skill of contemporary blacksmiths. No finer work has ever been done on such a scale, and they can hold their own as a product of the early days of the machine age with any iron work turned out in the past.

The system of framing is peculiar. An inside plate frame extended between the cylinders and the firebox; it was only 8 inches deep except over the axle boxes of the drivers. The firebox and after tank were joined by plates riveted to the sides of the firebox and the front of the tank, no real frame running to the rear buffer beam. The outside frame was riveted to the inside frame by a plate in front of the drivers, and behind them to the deck through angle irons. As this was rather a weak joint, the outside frame seems only to have been used to carry the axle box guides for the outside bearings of the drivers. The boiler was in reality part of the framing, as it was rigidly attached to the inside frames by the two heavy brackets in front of the drivers, as well as by the large gusset plate joining the bottom of the boiler to the cylinder casting and front truck pivot casting, and as the spring rigging of the drivers was also attached to the boiler by the equalizer gusset plates, it was the boiler that transmitted the load between the driving wheel springs and the inside frames.

The cylinders were 16x24; the domeless boiler with perforated steam pipe and slide valve throttle was small, being only 4 feet ½ inch in diameter and 10 feet 9 inches long, and a midfeather was built into the firebox. There seems to be no record of heating surface or grate area, but it is probable the first did not exceed 1100 square feet and the second 12 or 13 square feet. The fuel was coke, the average consumption being 21¾ pounds per mile. Water was carried in two tanks, one under the boiler and one at the rear, and Colburn gives the weight of these engines loaded as 42 long tons.

The beautiful detail of the machines is worth noting. The proportions of the wheels, the form of the spring casings, the boldness of the stack top, the fine contour of the safety valve cover, the pleasing symmetry, grace and originality of the engines, at once place Pearson in the front rank as a locomotive designer. Yet very little has appeared in print regarding them, and what has appeared is often in error. Colburn hardly mentions them, Clark not at all. Even "The Engineer," London, describes them erroneously, confusing them with engines built some 15 years later, and McDermot disposes of them in a few lines.

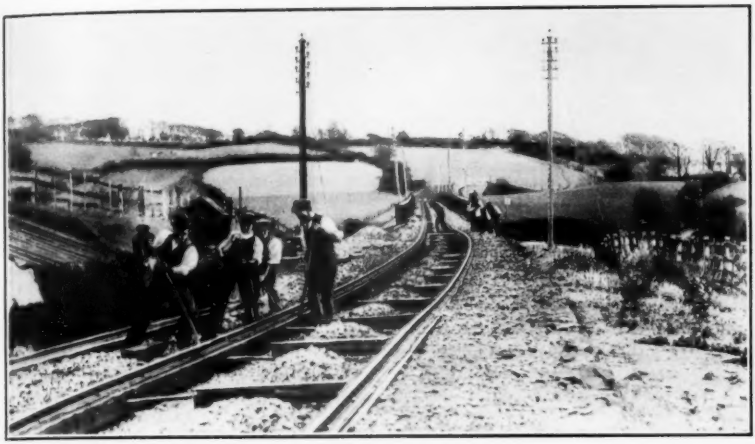
The best account, short though it is, appears in Ahrons "The British Steam Locomotive 1825-1925," and he makes the interesting suggestion that the wheel formation might have been brought to Pearson's attention by the testimony of Cubitt, the locomotive superintendent of the Brighton, Croydon and Dover Joint Committee, before the Gauge Com-

mission in 1845. He goes on to say that after an average life of 16 years, these eight engines were all scrapped between 1868 and 1873, due he thinks to defects in design, doubtless having in mind the complicated framing and the severe stresses this threw on the boiler. That Pearson realized this is shown by the fact that he built two locomotives of the same type but of smaller and simpler construction throughout, one in 1859 and one in 1862, the cylinders of the first being 17x24 and of the second 16½x24, the drivers of both engines being only 7 ft. 6 inches in diameter. Simple inside plate frames were used from end to end and the rubber springing was not repeated. They were designed with great care and were evidently thoroughly successful as they were only scrapped in 1887.

To replace the first and larger class, however, Pearson brought out four entirely new engines of the same wheel formation in the years 1866-73. In these he increased the wheel base to 25 feet 6 inches, though the truck wheelbase was shortened 3 inches, and he used an asymmetrical wheel arrangement, the front truck pin being 9 feet 8 inches from the driving axle and the rear one 10 feet 4 inches. The drivers which were new and again without flanges or counterbalances, were 8 feet 10 inches in diameter, the cylinders were 18x24 inches, the truck wheels being 4 feet as in the older engines. A simple plate frame ran from front to back buffer beam, and the conventional type of spring rigging was used. The trucks had independent eliptical plate springs under each axle, and brakes were fitted to both of them. The boilers were larger, with 1235 square feet of heating surface and 23.1 square feet of grate area. The weight in working order was 49 tons 14 cwt., of which 18 tons 10 cwt. was on the drivers.

The Bristol and Exeter was absorbed by the Great Western on January 1st, 1876, and its 95 locomotives were taken over. Six months later one of these new 4-2-4 tanks suddenly left the track when travelling at about 60 miles an hour, and was so badly damaged that it was scrapped. The official enquiry showed that the engine was in no way to blame for the accident, the track being found to be defective, but it was decided to rebuild the three remaining engines of the class. The work was done at Swindon, and it was in this rebuilding that Armstrong produced his only new broad gauge express engine, as it was the first time that a combination of a leading truck, inside frames and inside cylinders were used in a locomotive of the 4-2-2 type. They were used along with the Gooch 4-2-2 engines in the fastest broad gauge express work, and the last of them was scrapped in 1890.

Armstrong died in 1877, and was succeeded by William Dean, his assistant. It was realised by this time that the days of the broad gauge were drawing to an end, and that when this came there would be a big increase in the number of narrow gauge engines needed to take the place of the broad gauge ones retired. To bridge this difficult period Dean developed the so-called convertible type of construction, in which the only difference between a broad and narrow gauge engine would be the length of its axles, the wheels being outside the frames on the broad gauge and inside the frames on the narrow gauge. This enabled him to build new broad gauge engines which were urgently needed, and yet



The conversion of the gauge. Note cut transoms ready for new alignment of inner longitudinal sleeper and rail.

Paddington Station, London, 10.15 A. M., May 20, 1892. Last broad gauge express for Penzance.

with but slight alteration to have sufficient narrow gauge power in hand once the broad gauge was abolished.

In 1888 Dean built two convertibles for heavy express work on the broad gauge, which were the most powerful passenger engines that ever ran on it. The drivers were 7 feet in diameter, the cylinders 20x24, and the boiler with a pressure of 180 pounds per square inch, had a heating surface of 1536 square feet. They weighed 44 tons, with 30 tons 18 cwt. on the drivers. There were four frames, the inner two of plate the outer ones of the sandwich type. One illustration shows the engines as running on the broad gauge, the other as altered to 4-4-0 machines for the narrow gauge.

The last passenger convertibles—eight in number—were built in April, August 1891, just prior to the change in gauge, and as part of an order of 30 engines to work the narrow gauge expresses when the change over came. It is interesting to observe how much these engines looked like one of Gooch's earliest passenger class, the 2-2-2 type of 1847, and to compare their dimensions with the "Great Western" of 1846. She weighed 29 tons, these 44. Her cylinders were 18x24, these had ones 20x24. Her wheelbase was 16 feet, these 18 feet 6 inches, and 18½ long tons were carried on their drivers as against 12 on hers. Both heating surface and grate area were less in the new engines than in "Great Western," but the boiler pressure was now 160 in place of 100 pounds per square inch. The sandwich frame was at last discarded, but its principle was retained as there were four plate frames running end to end, connected at intervals by cross stays. On the broad gauge the wheels were outside all these frames; on the narrow gauge, the wheels were between a pair of them on each side, the leaders and trailers being 4 feet 6 inches, and the drivers 7 feet 8½ inches in diameter.

Dean used a boiler with a raised firebox casing in this class, reverting to early Gooch practice, as well as a dome covered by a polished brass casing in these engines and the 2-4-0 machines just mentioned, this being the first time domes had been used on broad gauge express locomotives. A brass safety valve cover and a copper topped stack were also used, and spare broad gauge tenders were supplied to both classes.

After the change of gauge, the 2-2-2 class had only been in service a few months when one of them ran off the track while travelling at high speed. Once more, as in the case of "Great Western," the leading axle was at fault, too much side play having been allowed in the axle boxes. The whole 30 were rebuilt as a 4-2-2 type and 50 additional ones of the same wheel formation put in hand. They had all been scrapped by 1915, domeless boilers having been fitted to several again in the meantime.

This concludes the account of the principal broad gauge passenger locomotives to which this article has been chiefly confined, as on May 20th, 1892, the last portion of Brunel's 7 foot gauge was abolished. Gooch did not live to see the end of it, as he had died in 1889. But the Stephenson tradition had won, and it was he as Chairman who had engaged Louis Trench from the London and North Western Railway, that old Stephenson preserve, to be the engineer in charge on the conversion.

Extensive conversions, apart from the addition of mixed gauge, had

already been made in 1872 and 1874, and in 1892 there remained 177 miles of line to be dealt with, consisting chiefly of the main line from London to Penzance, the total track mileage being about 213 miles, 36 of which was cross tie road, as already mentioned. Because of the longitudinal type of track, it was not possible to lay a third rail to narrow gauge and take up the broad gauge rail at leisure. Each transom had to be measured and alternate ones disconnected and cut to narrow gauge length, this being done before the main work of conversion began. There were four stages to the process.

1. Removing the bolts and tie rods and cutting the remaining transoms.
2. Slewing the timbers carrying the rails inwards.
3. Refixing the bolts and tie rods.
4. Repacking the ballast.

About 4200 men were distributed along the line in gangs of 20 to the mile for this work, and 15 miles of sidings had been laid down at Swindon, which for a day or two previously had been filling up with the most amazing collection of rolling stock ever seen.

The last broad gauge express to Penzance, the famous "Cornishman," left Paddington at 10.15 a. m. on Friday, May 20, 1892, and the last broad gauge train into Swindon arrived about 5.30 a. m. on May 21st. By Sunday evening the 22nd, the whole of the 177 miles had been dealt with and regular passenger traffic was restarted on narrow gauge rails on the morning of May 23rd. It is estimated that the conversion of the line and the scrapping and altering of broad gauge rolling stock to the narrow gauge cost about £800,000.

Among the locomotives that ran on Brunel's gauge and that have been dealt with here, three designs stand out prominently from all the rest.

1. Gooch's standard express engines of 1840-42.
2. His "Iron Duke" class of 1847, and
3. Pearson's 4-2-4 tanks of 1853.

The second became the best known, and during their life were famous the world over. Sir William Ackworth in his "Railways of England" 1889, writes of them as follows:

"No traveller on the line . . . will see without a pang the stately "Iron Duke", the wandering "Tartar", or the swift flying "Swallow" disappear from the road that has known them for 40 years. No engines in the world have so long and so famous a history as these old engines of Sir Daniel Gooch. Save that they have lost the sentry box at the back of their tender, from which the guard used to keep watch that his train was duly following, they look to-day, with their great 8 foot driving wheels, and their old world brass mounted boilers and brass wheel covers, just as they must have looked forty years ago, when our fathers gaped open-mouthed at the tale of their achievements, and indeed their achievements were, in sober truth, remarkable enough."

Aside from the few original parts built into the new "North Star", and a pair of 8 foot driving wheels that were still in existence at Swindon a few years ago, practically nothing remains of these old engines, except an occasional name-plate in some private collection or museum. Even original drawings of them are rare, the writer being unable to find any contemporary ones of the "Iron Duke" class at Swindon, when the authorities were good enough to grant him every facility for doing so,

though he did come across a few of Gooch's 4-4-0 type of 1855, and a good many of Pearson's tanks, which had been preserved at Bristol. Photographs of the broad gauge era are also comparatively few in number, and many of the earlier engines were never photographed at all. Few show broad gauge trains in motion, as instantaneous photography was only perfected in the late 1880's. A lot of early photographs were destroyed in an incredible manner only a few years ago. A junior draughtsman at Swindon came across an old box which had evidently been misplaced for many years. In it he found a large number of old fashioned glass plate negatives of broad gauge rolling stock. He asked his immediate superior permission to take prints of these, only to see this same superior destroy the plates before his eyes by scratching off their emulsion.

The appearance of the earliest engines is best shown in a series of contemporary sketches in the note books of E. T. Lane, now preserved in the South Kensington Science Museum. Lane was an employee in the locomotive department at the time, and possessed some talent as a free hand draughtsman. His sketches have enabled G. F. Bird to reconstruct these early engines in his well-known set of mechanical drawings, three reproductions of which appear herewith.

In view of the above, the illustrations for this article have been selected with some care, and as far as is known, have never been gathered together under one cover before. It is hoped that they will give some idea of the grand scale on which Brunel built his railway, and the appearance of the Gooch and Pearson express locomotives that did so much to make it famous.

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EDITOR'S NOTE:—As stated by Mr. Pennoyer at the outset of his contribution, August, 1935 marked the centenary of the Great Western of England. The Great Western is of unusual interest to all students of railway history and this should include we Americans. It is only fitting and proper that this material should appear at this time. Mr. Pennoyer has spent no little time in gathering this material and presenting it properly and, through the kindness of some of our members, who generously contributed sufficient sums for the purpose, we are enabled to reproduce the large number of photographs which accompany this article.

Locomotive Lists

Commencing with Bulletin No. 26 we began the series of articles on the Boston & Maine R. R. locomotives which is concluded in this bulletin. That this information has been keenly appreciated by many of our readers, your Editor is fully aware. Due to the method of handling the numbering of the engines of the leased lines it was possible in this instance to divide the series in such a way as to make each number of interest and value and have it fit in with the general plan.

For over three years, one of our members has been compiling a complete roster of the Chicago, Burlington & Quincy R. R. and its subsidiaries. The information was gathered from the different locomotive builders and from the records of the road. The work is probably as correct as has ever been assembled. This list, on account of the handling of the locomotives, does permit divisions as carried out in the Boston & Maine material. The list, commencing with 1855 is too long to appear in any of our regular publications. The only way it could be handled as a complete list would have it appear as an extra publication. The question next arises, are there enough of our members who would be willing to pay about $2.50 for this complete roster of C. B. & Q. engines from 1855 to date, including all known builders' numbers and dimensions?

While we are on this subject, it might do no harm to express your opinions in the following way:

1. I believe the publication of lists, such as the Boston & Maine list which is concluded in this bulletin should be eliminated and the space given to other material.
2. I believe the publication of lists, such as the Boston & Maine list which is concluded in this bulletin should be continued with roads whose rosters will permit the division of the material.
3. I believe the Society should publish the list of C. B. & Q. engines from 1855-1935 in a special publication and I will gladly subscribe towards its cost.

Your Editor will be glad to have your opinions relative to the above. If enough of our members want the C. B. & Q. special edition, same will be illustrated and it will be the first time this detailed information, drawn from authentic sources, has ever appeared. Sit down and write a letter giving your frank opinion.

Early Days of The New Haven R. R. in New York

By Warren Jacobs

THE first railroads in the United States were, as a rule, built from seaport cities to the interior. In Massachusetts the three pioneer roads from Boston; to Worcester, Lowell and Providence, connected interior points with the sea. In Connecticut the Hartford & New Haven R. R. connected the interior towns with tidewater at New Haven, and the same was true of the Housatonic Railroad at Bridgeport.

The extension of the Hartford & New Haven to Springfield in 1844 made a through rail line from Boston to New Haven, where passengers took the steamboat to New York. No one, as yet, had dared to contemplate the construction of a 74 mile line from New Haven to New York parallel to Long Island Sound.

Competition with the steamboat, in the early days of the railroad, was as keen, as it is to-day with busses, trucks and flying machines. However, the railroad survived, as it has survived the bicycle and electric car era, and will survive the automobile era, for the railroads are not only vital to the American people in time of peace, but doubly so in time of war, where no other transportation agency could move troops and supplies in mass, as can the railroads.

With these facts in mind it is easy to understand why a railroad from New Haven to New York was not chartered earlier. In fact when it was chartered in 1844 there were already 4377 miles of railroad then in operation in the United States. Many people thought the road would never be a success, as what were to be its four principal stations; New Haven, Bridgeport, South Norwalk and Stamford, were well served by steamer connection with New York City.

The New York & New Haven Railroad was chartered on June 10, 1844 to construct a road from New Haven to Williamsbridge, N. Y., then a town in Westchester County, where it was to connect with the Harlem road. By an agreement dated March 17, 1848 the Harlem tracks were to be used into the City of New York. This agreement, modified by five supplementary agreements in 1872-1885-1897-1898-1899 is still in effect, the supplementary agreements all being "subject to the provisions of said contract of March 17, 1848".

The first meeting of the stockholders of the New York & New Haven was held at 1 Hanover St., New York on May 19, 1846 and the following residents of New York City were elected as Directors of the Company: Robert Schuyler, Engineer, 2 Hanover St., home at 13 Laight St.; Morris Ketchum, Broker, 47 Wall St., home at 141 Eighth St.; Anson G. Phelps, Merchant, 19 Cliff St., home at 31st St., near Kipp's Bay; Elihu Townsend, Merchant, 58 Merchants Exchange, home at 36 Union Place. The other Directors were: Henry J. Sanford, Stamford; W. P. Burrall and Stephen Tomlinson, Bridgeport; Joseph Sheffield, New Haven and T. R. Griffin, Guilford. Robert Schuyler was elected President, William P. Burrall, Secretary and Morris Ketchum, Treasurer.

Surveys for the road were commenced in Sept. 1844 and construction began in May 1847. The road was opened on Dec. 29, 1848 and the following is the first time table, taken from the old files of the New Haven *Palladium* in the New Haven Public Library:—

NEW YORK & NEW HAVEN R. R.

On and after Friday, December 29th 1848 and until further notice, trains will run between New Haven and New York as follows;—

Leave New Haven at 9 o'clock A. M. and 1 P. M.
Returning leave New York at 8½ o'clock A. M. and 3½ P. M.
A train leaves New York at 8 o'clock A. M. and connects with the Housatonic train for Albany at Bridgeport.
Also one from the Housatonic from Albany, leaving Bridgeport at 3 o'clock P. M.
The Cars start from the Depot in Chapel St. New Haven and from Canal St. near Broadway in New York.

R. B. Mason, *Engr. & Supt.*

The first station in New York at No. 29 Canal Street was located between Elm St. and Broadway, the cars being hauled down-town by horses. Mr. J. A. Droege in his "Passenger Terminals and Trains" says that at first "the engine came as far south as 14th St.," but this was not for long and in the "Strangers Hand-Book for the City of New York" published in 1853 it says "the engine is attached at 32nd St." The first offices of the Company at 1 Hanover St. were transferred to 29 Canal St. after the opening of the road.

The Canal St. station lasted until July 15, 1857 when the New York & New Haven moved up-town to a joint station with the Harlem road at 4th Ave. and 27th Street, on the site of old Madison Square Garden, the following being the notice of the transfer of the trains to 27th St., taken from the old files of the New York *Tribune:*

OFFICE OF NEW YORK & NEW HAVEN R. R.
CANAL STREET, NEW YORK
June 22, 1857

Notice—Owing to the inclemency of the weather, having retarded the work upon the new Depot at 27th St. the haulage of the passenger cars of the New York & New Haven R. R. Co. to and from Canal Street will continue until Wednesday the 15th Day of July 1857 and be discontinued on and after that date.

J. H. Hoyt, *Supt.*

The announcement of the transfer to 27th St. is also taken from the old files of the New York *Tribune* for Thursday, July 16, 1857.—"New Haven Railroad Change—The trains of this railroad commenced Wednesday morning to start from the new depot at the corner of 4th Ave., and 27th Street. As a large portion of the furniture and conveniences used by the ticket agent etc. had to be moved on Tuesday night after the close of business at Canal St., everything up town this morning was naturally in a most glorious state of confusion; but this trouble will, of course, be soon remedied. The closing of the doors of the car yard against all but those showing passage tickets caused some dissatisfaction to persons wishing to see their friends off by the train, but the Superintendent naturally thinks that the fine saloons of the depot afford

the best and most suitable facilities for shaking hands and the exchange of more affectionate adieus''.—Evidently it was then that the custom began of showing tickets at the gates, which has always been in use at Grand Central.

The business of the New York & New Haven R. R. increased to such an extent that a second track was commenced in October 1850 and finished in March 1853 and the first time table from the 27th Street station shows that there were then, six trains each way between New York and New Haven, six to Bridgeport, eight to South Norwalk and nine to Stamford. It was from the 27th St. station that Abraham Lincoln left for Providence on the morning of Feb. 28th, 1860, after his famous speech in Cooper Union the night before.

The number of commuters in 1856, the last year of the old Canal St. station, to points in the New York suburban zone, between New York and Stamford, was as follows:—

Mount Vernon	129
New Rochelle	97
Mamaroneck	44
Rye	32
Port Chester	36
Greenwich	20
Stamford	79
Total	437

To-day any one of these stations furnishes more than ten times the number of commuters then. However, commuting in 1856 was vastly different from to-day. Then it took a local, from Canal St. to Stamford about two hours to make the run and even the ''crack'' 8.00 A. M. ''Boston Express'' took one hour and forty five minutes. To-day there are more than sixty trains to Stamford, many of them express trains running at high speed and making the run in fifty minutes.

New York of the 1850's was like a country village compared to the New York of to-day, but there are still a very few relics of its early railroad days, the most important being the old Harlem tunnel under Murray Hill which is the original tunnel. Up to the 1890's on Canal St., west of Broadway, there were still many buildings that were there in the days of the old New Haven depot and the home of Robert Schuyler at 13 Laight St. was still in existence. If you ever take a walk through that section early on a Sunday morning, it is easy to visualize the dignified first President of the New York & New Haven with the tall ''beaver'' of the period and long tail coat, walking from his house along Canal St. to the office of the railroad company at No. 29.

Another relic of old New York is the preservation of a part of the retaining wall of the Croton reservoir on 42nd St. The reservoir stood on the site of the New York Public Library and in the early days of the New Haven, in New York, the favorite drive of New Yorkers from downtown was up to and around the reservoir, all being open country then above 14th Street.

The New York & New Haven R. R. was one of the very few early roads that did not name their engines. When the road was opened in 1848 the Company had five locomotives. This was increased to eleven in 1849 and to 25 in 1853. When the New York & New Haven and the Hartford & New Haven roads were consolidated in 1872 as the present New York, New Haven & Hartford Railroad, the N. Y. & N. H. had 36 engines and the H. & N. H. 34, a total of 70 for the consolidated company. This jumped to 84 in 1873, to 121 in 1885 and in 1892 the total was 239. The Hartford & New Haven R. R. engines were named and these names were retained for some time after the consolidation with the N. Y. & N. H. The red stacks of the New York, New Haven & Hartford engines finally disappeared in the late 1880's.

The first freight station of the New Haven in New York was located down town in Center St. not far from the Canal St. depot and express cars still ran down to White Street long after the passenger trains were transferred to 27th St. On Dec. 31, 1885 the Center Street freight station was abandoned, doing away with hauling freight cars down through the Bowery by horses, and a new freight station was opened at Pier 50 East River.

The Harlem River Branch was opened on Nov. 24, 1873 and the entire territory then, from New Rochelle to Harlem River was sparsely settled country, much of it heavily wooded. With the coming of the Centennial year of 1876 there was placed in service a through Boston-Washington night express and a Philadelphia day express via Harlem River and Steamer Maryland. These were the first through passenger trains over the branch. It is a fact, long since forgotten, that there was at one time a "Brooklyn Annex" connection with the Philadelphia day express at Harlem River.

An old time table of the Harlem River Branch from the New York *Tribune* of July 5, 1886 may be of interest:—

HARLEM RIVER BRANCH

NEW YORK, NEW HAVEN AND HARTFORD RAILROAD

Trains leave Harlem River Station corner of 132nd St. and Lincoln Ave. near 3rd Ave. Bridge across Harlem River (reached by 3rd Ave. L. R. R.) daily except Sundays;—at 6.45—7.50—9.10—10—11.55 A. M. 2.10—3.55—4.40—5.40—6.40—8—10.30 P. M. for Port Morris, Casanova, (Oak Point) Hunts Point, West Farms, Van Nest, West Chester, Timpson's, Bay Chester (Pelham Bay) Bartow (City Island) Pelham Manor and New Rochelle. Connecting at New Rochelle with trains for all points on the main line of the New York, New Haven & Hartford R. R. Shore Line and Air Line Divisions, New Canaan, Middletown, New Britain, and Suffield Branches and Boston and all points east.

Midnight train for New Rochelle and all intermediate stations at 12.10 A. M. daily except Mondays.

Sunday trains for New Rochelle and all intermediate stations at 9 A. M., 12.01 and 9.30 P. M. the latter train connecting at New Rochelle with way train to Stamford.

As already mentioned, the General Offices were located at first at 1 Hanover St. then at 29 Canal St. In 1857 they were removed to 27th St.; in 1872 to the New Grand Central Depot on 42nd St. and in 1888 were transferred to New Haven. Up to the time when the first Grand

Central Station was enlarged in 1899, the old sign "New York & New Haven R. R. Offices" still remained over the office entrance on 42nd St. In the first Grand Central, the New Haven had its own waiting-room with entrances on the front of the building on 42nd St., the Hudson and Harlem Divisions of the N. Y. C. being around the corner on the Vanderbilt Ave. side.

The first Grand Central Station was built and named by Commodore Vanderbilt. Its great arched train-shed 600 ft. long and covering 15 tracks was the largest ever built up to that time. The station was first used by the Harlem Division on Oct. 9, 1871 and by the Hudson Division on Nov. 13, 1871, although some of the Hudson Division local trains still used the old 30th St. station for some time after. The line from Spuyten Duyvil to Mott Haven was built in order that Hudson Division trains could use the new Grand Central Depot. The New Haven did not abandon the old 27th St. station until Nov. 21, 1872.

Incidentally the old Hudson River depot on 30th Street was opened on Feb. 19, 1861 the day that Abraham Lincoln arrived in New York on his way to Washington for inauguration as President of the United States. He was one of the first passengers to use the station. His funeral train left from this station for Albany in 1865. This building, one of the most historic in New York City, was recently torn down to make way for a new parcel post building.

The Grand Central Station, when it was first opened, was considered "way up-town" as the only means of reaching it then was by horse-car or stage. The opening of the Manhattan Elevated Ry. in 1878 brought the station into quicker communication with down-town.

The old Harlem tunnel between 33rd and 42nd Streets was opened on Oct. 26, 1837 and considered a marvel then. The New York *Mirror* for the following week contains an interesting account of the opening.

From 1848 until its consolidation with the Hartford and New Haven in 1872, the New York & New Haven had three Superintendents; Roswell B. Mason, George William Whistler and James H. Hoyt, all notable men.

Roswell B. Mason, a civil engineer by profession, and the first Superintendent of the road from 1848 to 1851, was born at New Hartford, N. Y., Sept. 19, 1805 and as a boy was employed as a teamster on the Erie Canal. In 1822 he became a rodman under Edward F. Gay, Assistant-Engineer in charge of construction. Mr. Mason was later employed on the Schuylkill and Morris Canals, becoming Chief Engineer and Superintendent of the latter.

With the dawn of the railroad era Mr. Mason turned to railroading and on May 20, 1837 he commenced the survey and location of the Housatonic Railroad at a point about three miles north of Bridgeport as Chief Engineer. The road was opened from Bridgeport to New Milford on Feb. 11, 1840. He then became connected with the New York & New Haven R. R. and resigned in 1851 to go west with the Illinois Central, taking charge of the work of construction, and with the exception of the year 1860 when he was Superintendent of the Chicago & Alton, remained with the Illinois Central. He was Comptroller of the Land Department from 1861 to 1867. In 1869 he was elected Mayor of Chicago and it was

during his term of office the great Chicago fire occurred. He died Jan. 1, 1892.

George William Whistler, Superintendent from 1851 to 1853 was born at New London in 1822 and was the son of Lieut. George Washington Whistler who was Chief Engineer and Superintendent of the Western Railroad (now Boston & Albany) who went to Russia in 1842 as Superintending Engineer of the St. Petersburg and Moscow Railroad.

George William Whistler began the practice of his profession as a civil engineer under his father in 1840. He was Superintendent of the New York and New Haven and also of the Erie.

In the winter of 1856 he went to Russia to take charge of the St. Petersburg & Moscow R. R. and remained there until the spring of 1869 when he resigned on account of ill health. He was specially noted for his knowledge of railroad machinery and for executive ability in the management of railroads. He died at Brighton, England, December 24, 1869 and was the brother of James Abbott McNeill Whistler, the noted artist.

James H. Hoyt, Superintendent from 1853 to 1872, was born at Stamford, Conn. April 14, 1809 and at the age of seventeen was apprenticed to a cabinet maker and took over the business on reaching his majority. He was later in the dry goods and grocery business in Stamford with his two brothers, and was also connected with the lumber business. When the New York and New Haven Railroad was projected he entered into contracts for grading, building bridges and furnishing ties and at the time of the laying of the second track he was a large contractor on the work. He became Superintendent of the road in 1853 and held that office until Sept. 7, 1872 when he resigned. He died at Stamford, December 12, 1873. It was during Mr. Hoyt's term of office that the New York & New Haven moved from Canal to 27th Street.

Robert Schuyler, the first President of the New York & New Haven R. R., and Morris Ketchum, first Treasurer, were among the petitioners for the granting of a charter to the Illinois Central Railroad, which was granted by the Illinois legislature on February 10, 1851.

Another official of the old New York and New Haven R. R. was Jacob Mendel, General Ticket Agent, whose service dated back to the opening years in Canal St. It was his family who founded Mendel's restaurant, famous at Grand Central for many years.

Among the early Conductors of the New York and New Haven were; John Bradley (related to Osgood Bradley, the car builder of Worcester) E. C. Cornwall, E. H. Sanborn, D. Bacon, I. C. Stock, E. M. Allen, A. French and W. Nichols. The service of most, if not all of these men, dated back to the days of the Canal St. station.

Henry Kettendorf, who was an engineer, later became the Master Mechanic of the road and continued as such on the consolidated New York, New Haven & Hartford R. R. In the Baker Library is the large group picture of the Engineers of the New York, New Haven and Hartford Railroad in the 1880's presented by them to Mr. Kettendorf. This is one of the finest group pictures of railroad men ever gotten together, each photograph full cabinet size. After the death of Mr. Kettendorf

the picture was hung in the Directors Room in the General Office Building in New Haven, but was stored in later years. It was presented to this Society through the courtesy of Mr. J. A. Droege, Vice-President and General Manager of the New Haven Railroad, now retired.

The old station at Bridgeport was opened on January 1st, 1861 and when Hannibal Hamlin, Vice-President with Lincoln, left Boston at 8.30 A. M. Feb. 19, 1861 en-route to Washington for the inauguration, his train stopped at this station. One of the largest crowds ever assembled in Bridgeport was on hand to greet the vice-president-elect.

Boston and New York service over the New York and New Haven R. R. began shortly after the opening of the road. In the Boston *Advertiser* for January 1849 there is a notice of the Boston & Worcester R. R. reading:—"Through to New York by Railroad via Springfield and New Haven. Cars leave the Worcester Depot on Albany St. daily, Sundays excepted, at 7 A. M." This was undoubtedly the first advertisement ever printed of Boston and New York all rail service.

In May 1849 a notice in the Boston *Advertiser* reads:—"For New York via Springfield—By Railroad to New Haven and thence by Steamer. Cars leave Worcester depot on Albany St. daily, except Sundays, at 4 P. M." This train is now the 4.00 P. M. Springfield Line express, but has not had continuous fixed departure time since 1849, as it has left both Boston and New York at various times during the afternoon, from 2.00 P. M. to 4.30 P. M. It has, however, continuous service at 4.00 P. M. since June 24, 1888.

In March, 1850, the Boston & Worcester advertised that "the 7.30 A. M. is the New York express through By Railroad, and the 4.00 P. M. was for Springfield, Hartford and Steamboat to New York."

The "New York and Boston Express Line" first appears in Snow's *Pathfinder* for Sept. 1853 with two through trains, leaving Boston at 8 A. M. due New York at 4 P. M. and leaving Boston at 4.30 P. M. due New York at 12.25 A. M. From New York the morning train left at 8 A. M. due Boston at 4.30 P. M. the afternoon train leaving New York at 5.00 P. M. due Boston 12.30 A. M. A foot-note says: "The 5.00 P. M. is express from 32nd St. to New Haven, due New Haven 7.45, Hartford at 8.30, Springfield 9.35 and Worcester at 11.05 P. M."

First through train service over the Shore Line began on December 12, 1859—75 years ago—and the original notice is preserved in the rooms of this Society at the Baker Library, to-gether with a Springfield Line notice of 1851.

The first night train between New York and Boston was placed in service in 1859. This was a mail train. The first regular night train was in Nov. 1860 leaving New York at 8.00 P. M. due Boston at 6.15 A. M. and leaving Boston at 9.00 P. M. due New York at 5.50 A. M. These trains ran via Springfield. The first night train on the Shore Line was in August 1861.

The following is a list of the various sleeping cars lines that have been used in Boston-New York service:—Hapgood's Monarch, Mann Boudoir, Wagner, Allen's Hotel Car, New Haven and Pullman. No dates are available as to when these cars were in use, except that New Haven sleepers were taken over by the Pullman Company on January 1st, 1913.

The first parlor-cars between Boston and New York via Springfield went into service on June 15, 1869, an original notice is in the Baker Library rooms. They were called then drawing-room cars and were "particularly recommended to ladies and invalids".

Shore Line trains were ferried across both the Connecticut and Thames rivers in the early days of the line. On October 12, 1880 General U. S. Grant left New York for Boston on the 1.00 P. M. Shore Line express, the General and party occupied one of the regular Wagner parlor-cars of the Shore Line. The trip was one continual ovation, crowds being on hand at Stamford, South Norwalk, Bridgeport, New Haven and all points to Boston at which the train stopped.

From the opening of the Thames River Bridge on October 10, 1889 may be said to date the beginning of the renowned Shore Line of to-day. See Bulletin 33 for the travels of Abraham Lincoln over the Shore Line.

The first six hour train on the Shore Line was the famous Gilt Edge express which made its first trip on June 25, 1888 and was called then the New Limited Express. It was also the first Shore Line train to have a dining-car. This train, still in service to-day, is one of the oldest and most popular of the Shore Line trains.

On June 26, 1893 there was placed in service the first five hour train between New York and Boston, known as the Bay State Limited, making the run from New York to New Haven in one hour and thirty minutes.

Through service over the Air Line began on Nov. 10, 1884 with a train known as the New England Limited, leaving either city at 3.00 P. M. Dining-car service between Boston and New York began in 1884 and this train carried a diner between Boston and Willimantic. The engine that hauled the first trip of the New England Limited from Boston to Willimantic was New York and New England No. 45, Engineer Eugene E. Potter and Fireman William H. Goodwin. The old New England Limited is historic as it became the famous White Train or "Ghost Train," as it was popularly called, on March 16, 1891. This train, all white cars, was probably the most remarkable train ever run between Boston and New York and no one to-day that ever saw it or was a passenger will ever forget it. E. E. Potter ran the engine the entire time the train was in service and the Conductor was M. W. Crowley. Potter was one of the most famous locomotive engineers of his day and his running of the White Train on a hundred per cent on time schedule won for him the life long friendship of President Charles P. Clark. Potter and Crowley ran together for thirty five years on New York trains, a most remarkable record. Both are now dead but two better railroad men never lived.

The White Train was succeeded by the Air Line Limited Express in 1895 and this train had the distinction of being the only train ever operated by the New Haven Railroad to run through New Haven without stopping. Through service over the Air Line was finally discontinued in 1902.

From the earliest years of Boston-New York service the New York & New Haven R. R. held the "key" position in its line from New Haven to New York and this was even more apparent after the organization of

the New York, New Haven & Hartford Railroad, when the old New York & New Haven R. R. became first the New York & New Haven Division and then the New York Division. William D. Bishop of Bridgeport was the first President of the consolidated company and remained in office until 1879 when he was succeeded by George H. Watrous from 1879 to 1887 and then came Charles P. Clark from 1887 to 1900.

Charles P. Clark was born at Nashua, N. H. August 11, 1836 and was a Lieutenant in the United States Navy during the Civil War. He entered railroad service in 1870 as clerk to the receivers of the Boston, Hartford & Erie R. R. (later the New York & New England) and rose to the head of that company and later the New Haven. He was one of the greatest railroad executives in the United States at that time. He died at Nice, France, March 21, 1901. It was during the administration of President Clark that the New Haven grew from a small Connecticut railroad to the big New England system of to-day.

In the 1890's the New York Division was four-tracked and this was followed by the raising of the tracks through Bridgeport. On August 20, 1905 the present Bridgeport station was opened and eventually all grade crossings on the New York Division were abolished.

In June 1907 the electrification between Woodlawn and Stamford was completed and was extended to New Haven in 1913.

On February 1, 1913 the new Grand Central Terminal was opened and this was followed by the opening of the Hell Gate Bridge on April 1, 1917 giving New Haven trains entrance to the Pennsylvania Station.

From the two trains between New Haven and New York in 1848, the New Haven to-day operates nearly two hundred trains a day at Grand Central, more than thirty being Boston-New York express trains. This does not include, of course, the Colonial, Senator, Federal and other trains using the Pennsylvania Station in New York City.

The little single track road, that many believed would never be a success, is to-day universally acknowledged to be one of the finest and most valuable pieces of railroad property in the world.

Can You Guess?

In a letter recently received from Dr. Edward Miller Jefferys, Honorary Member of this Society, he recounts the following story. His mother was the eldest daughter of that famous Engineer—Edward Miller and Dr. Jefferys was named for him. Edward Miller tells the story of how the President of a certain locomotive works came to him to urge the purchase of their locomotives by a railroad with which he was connected. Mr. Miller said to him, "I regard your locomotives highly, but we have noticed that when from an accident or any other cause they run off the track they go to pieces." To which the President replied, "That may be true, Mr. Miller, but as a matter of fact, we build our locomotives to run on, not off, the tracks!" The President appears to have had the best of the argument. Can any of our members guess the name of the President of the locomotive works? Send your guess to your Editor.

Chapter Publications

WITHIN the past few months the officers of our New York Chapter have proposed to issue a publication for the purpose of reprinting certain papers which may be read before their meetings and to use this publication as a medium to attract a further increase in our membership—both reasons of which are commendable.

The matter has been carefully considered by the Directors of your Society and the facts are simply these. Your Editor has expressed a willingness to reprint in our regular bulletin such papers of an historical nature as will be of general interest to our members, provided these subjects have not recently been made the subject of articles in our bulletins and that our New York members will not feel that we are granting space to material with which they are already familiar. Papers not of an historical nature are a bit beyond the scope and purpose of this Society for there are already plenty of technical journals covering that field. To date, no paper has been submitted from the officers of the New York Chapter to either your Editor or to Mr. Schmid, Chairman of our Eastern Committee on Publications.

In the matter of using such a publication to attract an increase in membership, your Directors upon the publication of our new leaflet in 1932 directed that our regular bulletins were not to be used for the purpose of attracting new members. This leaflet was edited by Mr. Edward Hungerford, our former Vice President and illustrated by Mr. Kuhler. It is a fine piece of work and adequately serves the purpose. Copies of this leaflet have been distributed to all of our officers and to those of our New York Chapter and more will be forthcoming upon request. Also, the New York Chapter has issued two leaflets which have creditably served their purpose.

While it is true that such clubs as the New York Railroad Club and the New England Railroad Club and other similar clubs do furnish their members with a booklet containing the addresses made to members during the year, the huge memberships of these organizations make it possible to produce these booklets at a low cost—something our New York Chapter is unable to do without imposing further financial burdens on our chapter members or calling for voluntary subscriptions.

Your Directors are not unmindful that if they grant permission to the New York Chapter to issue a publication similar to our official bulletin that this same privilege must be granted to any other chapter which may be formed. The confusion which would probably arise from these numerous publications would be hopeless and their value would be doubtful.

While the Directors realize the imperfections of the present publication, due to the relatively small membership of this Society, they recognize that an increase in membership will bring forth an increase in the number of pages and reproductions. With the increase in membership during the last year, our bulletin has already increased in size. We also furnished you with a catalogue of the material on exhibition in the Baker Library without requesting any financial aid from any individual. Your

Directors have always shown a willingness to improve their publications in any way within their means.

During the past few years we have printed in our columns many papers of genuine interest and value. These contributions have come from our members unsolicited. We want our members to feel that their contributions are welcome and that no especial part of this country is singled out for space in our columns. A visitor to our rooms recently stated that this Society should be credited with having uncovered more authors in the field of railroad history than any similar organization.

In view of these facts, the Directors of your Society feel that the publication of a magazine by the New York Chapter for the purposes which they have outlined is a duplication of facilities which already exist and that its publication is unwarranted. The Directors of this Society feel that one strong publication is far better than several which might be attempted by our chapters who have not the financial strength as yet to publish and distribute such a publication. The Directors feel that with proper co-operation on the part of our chapter officers the present bulletin can be made to serve their needs and they have unanimously stated that the right to publish all material directly affecting this Society rests with the duly constituted officers of this Society and not with the officers of any individual chapter.

"Rollin Into Kingfield"

Tune—"Jingle Bells."

Rollin' into Kingfield on the Sandy River Line—
By the silvery river's brim, by the spruce and pine;
Buckin', snortin', twistin'—Oh Boy, ain't it fine!
Rollin' into Kingfield on the Sandy River Line.

Steamin' like a kettle, as she climbs the ridge;
Purrin' like a pussy cat trundlin' 'cross the bridge;
Roarin' thru the moon-lit night—Oh Boy ain't it fine!
Rollin' into Kingfield on the Sandy River Line.

Rollin' into Kingfield through the deep white snows;
Hear the little engine sob as through the drift she ploughs,
Battlin' through to victory—Oh Boy, ain't it fine!
Rollin' into Kingfield on the Sandy River Line.

Red-hot stoves a-cracklin', drummers pipes alight,
Little lamps a-flarin' far into the night;
Happy, warm and cosy—Oh Boy, ain't it fine!
Rollin' into Kingfield on the Sandy River Line.

Take horse, or car, or steamboat, travel far away,
But the Sandy River Railroad o'er your heart holds sway;
And when once more you do come back—Oh Boy, ain't it fine!
Rollin' into Kingfield on the Sandy River Line.

CHARLES G. WILSON—1926.

Submitted by Laurence Breed Walker.

Locomotives of The Boston & Maine Railroad

By Chas. E. Fisher

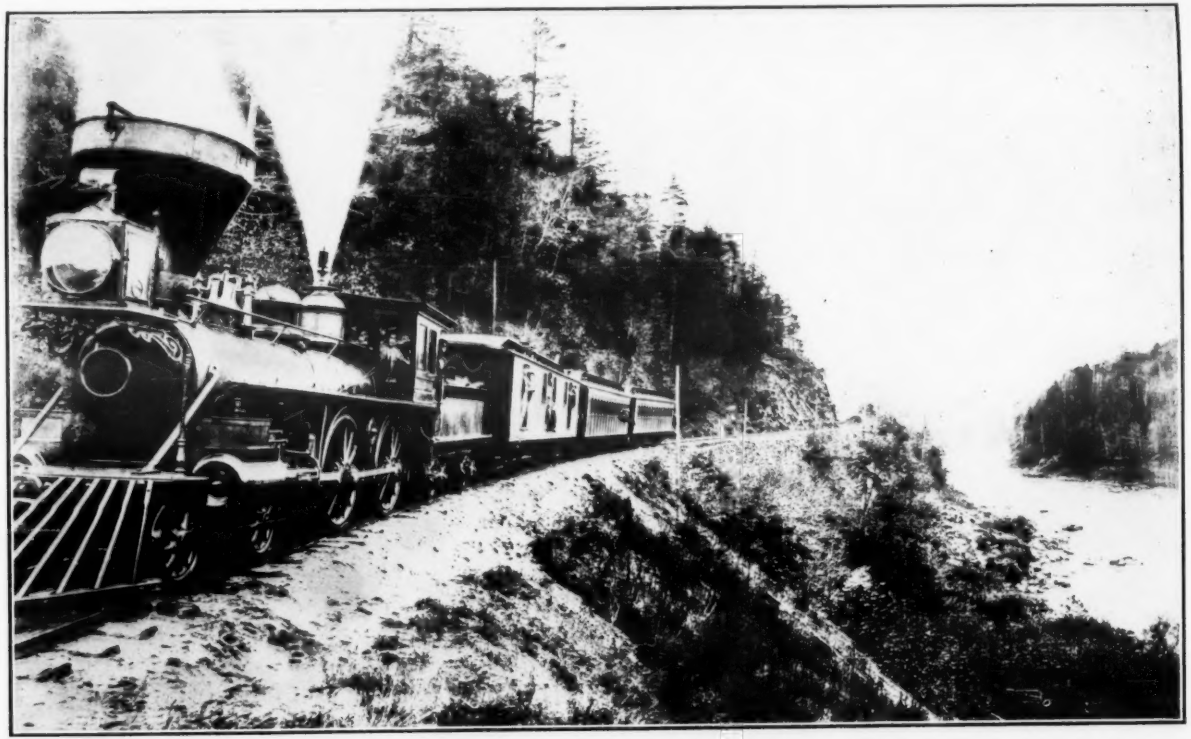
IN OUR last bulletin we listed the engines from the Fitchburg Railroad. This list did not include all of the locomotives owned by the subsidiary railroads which went to make up the Fitchburg R. R. The same system will be carried out in the matter of numbers—engines are arranged in their order on the subsidiary road and the 1895, 1899 renumberings of the Fitchburg and Boston & Maine number will be indicated, provided the locomotive was not scrapped in the meantime.

VERMONT & MASSACHUSETTS RAILROAD

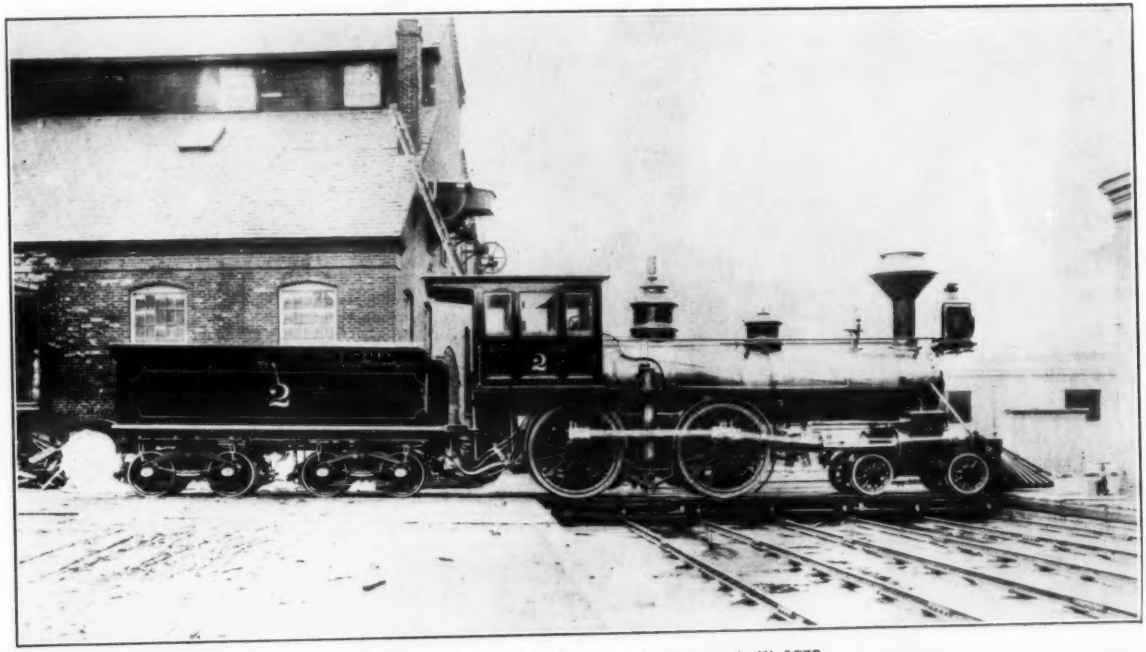
The Vermont & Massachusetts R. R. was chartered on March 15, 1844, to build a railroad from Fitchburg, Massachusetts to Brattleboro, Vermont, a distance of 69 miles. A branch, 8 miles in length, extended from Grout's Corner to Greenfield, Mass., and another branch, 2 miles in length extended from Greenfield to Turner's Falls, Mass. However, the 21 miles extending from Grout's Corner to Brattleboro was leased to the Vermont Central R. R. and is now a part of that road. The Vermont & Massachusetts R. R. leased the Troy & Greenfield R. R., a line extending from Greenfield to the Massachusetts-Vermonf State Line. On April 15, 1849, the Vermont & Massachusetts R. R. was opened for traffic and on January 1, 1874 it was leased to the Fitchburg R. R. and thus it came into the Boston & Maine System.

Turning now to their locomotives, the Annual Reports of the Vermont & Massachusetts R. R. give at no little length their motive power. Mr. Yeaton's list will be presented together with such revisions as are made necessary by these reports.

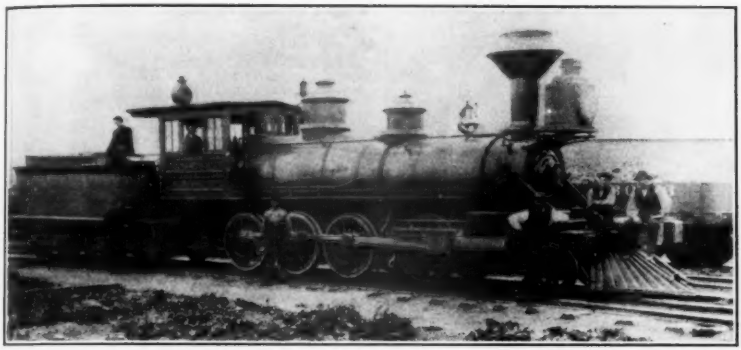
1	Vernon	Hinkley & Drury	#235	5-2-49	4-6-0	16x20"
1	Templeton	Hinkley & Wms.	—	1868	4-6-0	16x24"
	Renumbered F. R. R. 47					
2	Ashburnham	Hinkley & Drury	#219	12-26-48	4-4-0	15x20"
2	Turner's Falls	Hinkley & Wms.	—	1869	4-4-0	16x24"
	Renumbered F. R. R. 45-92-103—B & M 903					
3	Gardner	Hinkley & Drury	#230	3-24-49	4-4-0	16x20"
	Renumbered Vt. & Mass. 9					
3	Athol	Hinkley & Wms.	—	1869	4-4-0	16x22"
	Renumbered F. R. R. 50-90-110—B & M 910					
4	Templeton	Hinkley & Drury	#220	12-28-48	4-4-0	15x20"
4	Orange	Hinkley & Drury	#177	6-9-48	4-4-0	16x20"
5	Orange	Hinkley & Drury	#177	6-9-48	4-4-0	16x20"
	Renumbered Vt. & Mass. 4					
5	Westminster	Hinkley & Drury	#218	12-18-48	4-4-0	15x18"
6	Brattleboro	Hinkley & Drury	#233	4-18-49	4-4-0	16x20"
6	Wendell	Hinkley & Drury	#237	6-4-49	4-4-0	15x18"
7	Westminster	Hinkley & Drury	#218	12-18-48	4-4-0	15x18"
	Renumbered Vt. & Mass. 5					
7	Royalston	Hinkley & Drury	#221	12-29-48	4-4-0	15x18"
	Renumbered F. R. R. 43					



Vermont & Massachusetts R. R. "Whittemore." Hinkley & Williams, 1870.

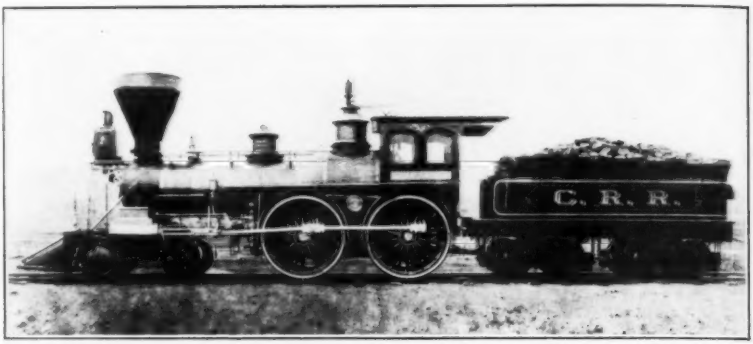


Boston, Hoosac Tunnel & Western R. R. #2. Taunton L. W. 1879.



Boston, Hoosac Tunnel & Western R. R. #5. Dickson, 1879.

Cheshire R. R. "David Upton." Cheshire R. R. 1866.



Courtesy of Messrs. Perry and Durgin

Cheshire R. R. "F. A. Perry" #25. Cheshire R. R. 1870.

Courtesy Benj. Thomas

Cheshire R. R. "Samuel Gould" #26. Cheshire R. R. 1870.

8 Royalston	Hinkley & Drury	#221	12-29-48	4-4-0	15x18″
Renumbered Vt. & Mass. 7					
8 Greenfield	Hinkley & Drury	#227	2-22-49	4-4-0	16x20″
9 Wendell	Hinkley & Drury	#237	6-4-49	4-4-0	15x18″
Renumbered Vt. & Mass. 6					
9 Gardner	Hinkley & Drury	#230	3-24-49	4-4-0	16x20″
Renumbered F. R. R. 54					
10 Northfield	Hinkley & Drury	#229	3-12-49	4-4-0	16x20″
10 Brattleboro	Hinkley & Wms.	—	1869	4-4-0	16x24″
Renumbered F. R. R. 44-91-101—B & M 901					
11 Greenfield	Hinkley & Drury	#227	2-22-49	4-4-0	16x20″
Renumbered Vt. & Mass. 8					
11 Thos. Whittemore	Manchester	# 49	6-20-64	4-4-0	15x20″
		(Wrecked & scrapped 1870)			
11 Whittemore	Hinkley & Wms.	—	1870	4-4-0	16x22″
Renumbered F. R. R. 51					
12 Gardner	Hinkley & Drury	# 95	3-30-47	4-4-0	14x18″
		(Renamed)			
Troy	Sold prior to 1852				
12 New London	Hinkley & Wms.	—	1867	4-4-0	16x24″
Renumbered F. R. R. 48-83-105—B & M 905					
13 Shelburne Falls	Vt. & Mass. R. R.		1868	4-4-0	16x24″
Renumbered F. R. R. 53					
14 Wachusett	Hinkley & Wms.	—	1868	4-4-0	16x24″
Renumbered F. R. R. 49					
15 Alvah Crocker	Hinkley & Wms.	—	1869	4-4-0	15x22″
Renumbered F. R. R. 46-27-161—B & M 961					

So far as can be learned no names of locomotives were changed by the Fitchburg R. R. when they took control of the Vermont & Massachusetts R. R.

BOSTON, BARRE & GARDNER R. R.

The Boston, Barre & Gardner R. R., successor to the Barre & Worcester R. R., was chartered in the State of Massachusetts on March 24, 1849, to build a railroad from Gardner (on the Vt. & Mass. R. R.) to Worcester, a distance of 26 miles. Work progressed slowly and it was not until Sept. 4, 1871 that the road was opened for traffic. On July 1, 1885 the road was leased to the Fitchburg R. R.

From Mr. Yeaton's list, seven engines came into the Fitchburg roster, as follows:

1 J. Livingston	Hinkley	—	1873	4-4-0	15x22″
Renumbered F. R. R. 101					
2 Gardner	Rhode Island	#285	1871	4-4-0	14x20″
Renumbered F. R. R. 102					
3 Worcester	Rhode Island	#309	1871	4-4-0	14x20″
Renumbered F. R. R. 103					
4 Princeton	Rhode Island	#388	1872	4-4-0	14x20″
Renumbered F. R. R. 104					
5 Wachusett	Rhode Island	#623	1873	4-4-0	16x24″
Renumbered F. R. R. 105					
6 Levi Haywood	Hinkley	—	1873	0-6-0	15x24″
Renumbered F. R. R. 106-350					
7 Monadnock	Rhode Island	#415	1873	4-4-0	16x24″
Renumbered F. R. R. 107					

Names were removed by the Fitchburg R. R.

ASHBURNHAM RAILROAD

The Ashburnham R. R. was originally chartered on May 5, 1871, to build a railroad between South Ashburnham and Ashburnham, Mass., a distance of 2.58 miles. The road was opened for traffic on Jan. 1, 1874 and came under the control of the Fitchburg R. R., by lease, on April 22, 1885. So far as we know the road had only one engine, which had a rather interesting career. The "Watatic", was built by Wm. Mason on Oct. 29, 1873, #520, 12x22" cyl. 54" drivers. When the road was taken over by the Fitchburg R. R., the engine was renumbered 108 and again renumbered 79. In 1895 the Fitchburg R. R. rebuilt the engine as an inspection engine, renamed it "Boston" and carried the number 77, later 100. The Boston & Maine renumbered the engine 900 and in 1901 it was destroyed by a fire at Mechanicville, N. Y. and the engine was scrapped.

TROY & GREENFIELD RAILROAD

The Troy & Greenfield R. R. was chartered to build a railroad from Greenfield to the Massachusetts-Vermont State Line, a distance of 44 miles. The barrier of mountains, until the Hoosac Tunnel was completed, effectively divided the road. The portion from Greenfield, Mass. to the mountains was leased by the Vermont & Massachusetts and the eight mile section from North Adams to the Vermont-Massachusetts State Line was leased by the Troy & Boston R. R. The west end of the road was opened on April 1, 1859 and the east end was opened on July 1, 1868.

In the Annual Report of this road, dated 1876, we find the following relative to the opening dates of the Hoosac Tunnel.

"The 'Gov. Gaston', purchased in 1875, hauled the special train containing the Governor, Lt. Governor and Council on Oct. 13 and 14, 1875 through the Hoosac Tunnel.
"The first train through the tunnel—Feb. 9, 1875
"The first freight train through the tunnel—Apr. 5, 1875
"The first passenger train through the tunnel—July 8, 1875."

So far as we can learn, the road owned only four engines:

1	Gov. Gaston Renumbered F. R. R. 130	Hinkley		1875 Scrapped in 1891	4-4-0	15x22"
2	Deerfield Renumbered F. R. R. 131	Hinkley	#1227	1875 Sold	4-4-0	15x22"
3	Gov. Long Renumbered F. R. R. 128	Pennsylvania R. R.		1876	4-6-0	17x24"
4	Williamstown Renumbered F. R. R. 129	Pennsylvania R. R.		1876	4-6-0	17x24"

The road was leased to the Fitchburg R. R. on Feb. 1, 1887 and names were removed from these engines.

TROY & BOSTON RAILROAD

The Troy & Boston R. R. was chartered on Nov. 22, 1849 to build a railroad from Troy, N. Y. to the New York-Vermont State Line, a distance of 34 miles. The road was opened for traffic on Aug. 1, 1852. By leasing the Southern Vermont R. R. (Vermont-New York State Line to Vermont-Massachusetts State Line), the road reached North Adams over the tracks of the Troy & Greenfield R. R., a distance total of 49 miles. The road was leased to the Fitchburg R. R. on May 3rd, 1887.

Turning to Mr. Yeaton's list, we find the following engines were owned by the road.

1	John Paine	Hinkley & Drury	# 352	1-9-52	4-4-0	16x20″
	Rebuilt in			1880		
	Renumbered F. R. R. 134					
2	H. Durkee	?	—	?	?	?
	Renumbered F. R. R. 135					
3	C. L. Tracy	Hinkley & Drury	—	1850	4-4-0	16x20″
	Rebuilt in			1880		
	Renumbered F. R. R. 136					
4	I. V. Baker	Schenectady	—	1862	4-4-0	15x24″
	Rebuilt in			1874		
	Renumbered F. R. R. 132					
5	George Gould	Hinkley	# 720	1862	4-4-0	16x24″
	Rebuilt in			1875		
	Renumbered F. R. R. 140					
6	Hoosac	Hinkley & Drury	# 319	8-1-51	4-4-0	15x18″
6	Hoosac	Troy & Boston R R		1878	4-4-0	16x22″
	Renumbered F. R. R. 138					
7	Jared S. Weed	?	—	?	?	?
	Renumbered F. R. R. 133					
8	Richard P. Hart	Hinkley & Drury	# 349	12-24-51	4-4-0	16x20″
9	Alvah Crocker	Hinkley & Drury	# 351	1-9-52	4-4-0	16x20″
10	D. Thomas Vail	?	—	?	?	?
11	Gen'l Wool	Hinkley & Drury	# 370	5-20-52	4-4-0	16x20″
	Rebuilt in			1880		
	Renumbered F. R. R. 137					
12	Walloomsac	Hinkley & Drury	# 335	10-13-51	4-4-0	16x20″
	Renumbered F. R. R. 131					
13	Pony	Schenectady	#1122	1879	0-4-0	16x22″
	Renumbered F. R. R. 139-342-603—B & M 1097					
14	Dan'l Robinson	Schenectady	#1842	1883	4-4-0	17x24″
	Renumbered F. R. R. 141-55-130—B & M 930					
15	C. W. Moseley	Schenectady	# 971	1875	4-4-0	17x24″
	Renumbered F. R. R. 142-48					
16	Lyman Wilder	Schenectady	#1071	1877	4-4-0	17x24″
	Renumbered F. R. R. 143-49-113—B & M 913					
17	J. H. Williard	Schenectady	#1072	1877	4-4-0	17x24″
	Renumbered F. R. R. 144-50-116—B & M 916-681—Rebuilt in 1901					
18	Jos. H. Parsons	Schenectady	#1085	1878	4-4-0	17x24″
	Renumbered F. R. R. 145-51					
19	W. H. Vanderbilt	Schenectady	#1185	1879	4-4-0	17x24″
	Renumbered F. R. R. 146-52					
20	S. B. Sanford	Schenectady	#1184	1879	4-4-0	17x24″
	Renumbered F. R. R. 147-53-117—B & M 917-682—Rebuilt in 1902					
21	William Kemp	Schenectady	#1717	1883	4-4-0	17x24″
	Renumbered F. R. R. 148-54-120—B & M 920					

BOSTON, HOOSAC TUNNEL & WESTERN RAILROAD

The Boston, Hoosac Tunnel & Western R. R. was chartered on Feb. 16, 1877, to build a railroad from Rotterdam, N. Y. to the New York-Vermont State Line, a distance of 54.74 miles. This portion of the road was opened Jan. 1, 1879. On November 26th, 1878, permission was granted to extend the road from the New York-Vermont State Line to the Vermont-Massachusetts State Line, 6.50 miles and this portion was opened for traffic in 1880. The tracks of the Troy & Greenfield R. R. enabled the road to enter North Adams, Massachusetts. The road was leased by the Fitchburg R. R. on October 1, 1892 and thus became a part of the Boston & Maine R. R. The locomotives never carried any names.

The Annual Reports yield nothing in the way of locomotive rosters and we have only Mr. Yeaton's list to follow:

1	Brooks	‡ 963	1884	4-4-0	17x24″	F. R. R. 162-67-134—B & M 934
2	Taunton	‡ 694	2-17-79	4-4-0	17x24″	Renumbered B H T & W 8
2	Brooks	‡1146	1884	2-6-0	18x24″	F. R. R. 165-216-216—B & M 991-1311
3	Taunton	‡ 695	3-24-79	4-4-0	17x24″	Scrap—BHT&W
3	Brooks	‡1057	1886	2-6-0	18x24″	F. R. R. 166-217-206—B & M 981
4	Dickson	‡ 227	4-3-79	2-8-0	20x24″	F. R. R. 169-100. Rebuilt by
	F. R. R.		1890	2-8-0	20x24″	
5	Dickson	‡ 228	4-17-79	2-8-0	20x24″	Sold
6	Dickson	‡ 229	4-27-79	2-8-0	20x24″	F. R. R. 170-101. Rebuilt by
	F. R. R.		1887	2-8-0	20x24″	
7	Norris	—	?	4-4-0	16x24″	F. R. R. 171. Rebuilt by
	F. R. R.		1885	4-4-0		
8	Taunton	‡ 694	2-17-79	4-4-0	17x24″	F. R. R. 149-56
9	Taunton	‡ 760	11-26-80	4-4-0	17x24″	F. R. R. 150
10	Taunton	‡ 761	12-8-80	4-4-0	17x24″	F. R. R. 151
11	Dickson	‡ 295	1881	2-6-0	18x24″	F. R. R. 163-214-222—B & M 997
12	Dickson	‡ 296	1881	2-6-0	18x24″	F. R. R. 164-215-223—B & M 998-1310
13	Rogers	‡2891	1881	4-4-0	17x24″	F. R. R. 152-27-122—B & M 932
14	Brooks	‡ 985	1884	4-4-0	17x24″	F. R. R. 161-66-133—B & M 933
15	Rogers	‡2895	1881	4-4-0	17x24″	F. R. R. 153-58-123—B & M 923
16	Rogers	‡3175	1883	4-4-0	17x24″	F. R. R. 154-59-124—B & M 924
17	Rogers	‡3312	1883	4-4-0	17x24″	F. R. R. 155-60-125—B & M 925
18	Rogers	‡3345	1883	4-4-0	17x24″	F. R. R. 156-61-126—B & M 926
19	Rogers	‡3364	1883	4-4-0	17x24″	F. R. R. 157-62-127—B & M 927
20	Rogers	‡3404	1883	4-4-0	17x24″	F. R. R. 158-63-128—B & M 928
21	Brooks	‡ 943	1883	4-4-0	17x24″	F. R. R. 159-64-131—B & M 931
22	Brooks	‡ 944	1883	4-4-0	17x24″	F. R. R. 160-65-132—B & M 932
23	Baldwin	‡8414	1887	2-6-0	19x24″	F. R. R. 167-190-225—B & M 1000-1321
24	Baldwin	‡8416	1887	2-6-0	19x24″	F. R. R. 168-191-224—B & M 999
50	Rogers	‡3200	1883	0-4-0	16x22″	F. R. R. 172-340-610—B & M 1104-308
51	Rogers	‡3426	1883	0-4-0	16x22″	F. R. R. 173-341-611—B & M 1105
A	Rhode Island	‡ 284	1871	0-4-0	14x22″	F. R. R. 174
B	Grant	—	1878	0-4-0	10x22″	F. R. R. 175
C	Grant	—	1878	0-4-0	10x22″	F. R. R. 176-357-600—B & M 1094

CHESHIRE RAILROAD

The Cheshire R. R. was chartered in the State of New Hampshire on Dec. 27, 1844, to build a railroad from the Massachusetts-New Hampshire State Line to Bellows Falls, Vermont. The Winchendon R. R. was chartered in the State of Massachusetts to build from South Ashburnham, on the Vermont & Massachusetts R. R., to the Massachusetts-New

Hampshire State Line. The entire line, 54 miles in length, was opened Oct. 4, 1847 as the Cheshire R. R. On October 1, 1890, the road was leased to the Fitchburg R. R. and through that road became a part of the Boston & Maine System. The Annual Reports of the Cheshire R. R. are extremely clear with reference to their locomotives and the following list is taken from these reports. Names of the locomotives were removed by the Fitchburg R. R.

The first roster appears in the report dated 1850 and is as follows:

Cheshire	18 tons Value	$7800.00	Hinkley & Drury	1848
Winchendon	18 tons Value	7800.00	Hinkley & Drury	1847
New Hampshire	18 tons Value	7800.00	Hinkley & Drury	1847
Ashuelot	20 tons Value	7800.00	Hinkley & Drury	1847
Vermont	22 tons Value	8000.00	Boston L W	1849
Boston	22 tons Value	8000.00	Boston L W	1849
Keene	22 tons Value	8000.00	Boston L W	1849
Monadnock	22 tons Value	8000.00	Hinkley & Drury	1848
Rough & Ready	10 tons Value	4000.00	Locks & Canal Co.	1840

The "Rough & Ready" in the above list was formerly the "Hampshire" on the Western (Mass.) R. R. In 1870 the Cheshire R. R. sold it to the Portland Locomotive Works where it was rebuilt and sold as the "Jefferson" to the Whitefield & Jefferson R. R.

The following locomotive roster is taken from the Annual Reports of the Cheshire R. R.

1 Rough & Ready	Locks & Canal Co.			1840	4-2-0	?	Rebuilt by
	Cheshire R. R.			1863	4-4-0	?	Sold—1870
1 Rough & Ready	Hinkley & Wms.		—	1870	4-4-0	16x24″	F. R. R. #201
2 Ashuelot	Hinkley & Drury	#	117	5-17-47	4-4-0	15x20″	Scrap—C. R. R.
2 G. W. Perry	Taunton L. W.	#	311	1863	4-4-0	15x20″	Scrap—C. R. R.
2 W. H. Hill, Jr.	Rhode Island	#1766		1887	4-6-0	19x26″	FRR Nos. 202-256-312 B&M 1052
3 Winchendon	Hinkley & Drury	#	123	9-24-47	4-4-0	15x18″	Rebuilt by
	Boston L. W.			1860	4-4-0	15x18″	Scrap—1882
4 New Hampshire	Hinkley & Drury	#	138	12-18-47	4-4-0	15x18″	Rebuilt by
	Cheshire R. R.			1860	4-4-0	15x18″	
4 R. Hyland	Rhode Island	#1650		1886	4-6-0	19x26″	FRR Nos. 204-255-311 B&M 1051
5 Cheshire	Hinkley & Drury	#	158	3-23-48	4-4-0	16x20″	Rebuilt by
	Cheshire R. R.			1860	4-4-0	16x20″	
5 Cheshire	Cheshire R. R.			1872	4-4-0	16x24″	F. R. R. #205
6 Monadock	Hinkley & Drury	#	168	5-9-48	4-4-0	16x20″	Rebuilt & renamed
Thos. Thatcher	Boston L W & C R R			1863	4-4-0	16x20″	
7 Vermont	Hinkley & Drury	#	231	4-4-49	4-4-0	16x20″	
7 Vermont	Hinkley & Wms.		—	1878	4-4-0	17x24″	FRR Nos 207-69-119 B&M 919
8 Boston	Hinkley & Drury	#	246	9-5-49	4-4-0	16x20″	
8 F. H. Kingsbury	Rhode Island	#1395		1883	4-6-0	19x26″	FRR 208-254-310 B&M 1050
9 Keene	Hinkley & Drury	#	247	9-20-49	4-4-0	16x20″	Rebuilt by
	Boston L. W.			1863	4-4-0	16x20″	
9 Keene	Cheshire R. R.			1880	4-4-0	17x24″	FRR 209-71-135 B&M 935
10 Massachusetts	Boston L. W.	#	293	1-25-51	4-4-0	16x20″	
10 Massachusetts	Rhode Island	#	915	1880	4-6-0	19x26″	FRR 210-250-306 B&M 1046
11 President	Boston L. W.	#	294	2-5-51	4-4-0	16x20″	Rebuilt & renamed
David Upton	Cheshire R. R.			1866	4-4-0	16x20″	FRR 211

12	Walpole	Boston L. W.	# 362	4-2-52	4-4-0	16x20″	
12	J. W. Dodge	Rhode Island	#1194	1882	4-6-0	19x26″	FRR 212-253-309 B&M 1049
13	T. M. Edwards	Boston L. W.	# 368	5-17-52	4-4-0	14x20″	Scrap—1886
14	Fitzwilliam	Boston L. W.	# 376	6-9-52	4-4-0	16x20″	
14	Fitzwilliam	Hinkley & Wms.	—	1868	4-4-0	16x24″	FRR 214
15	Westmoreland	Boston L. W.	# 404	10-8-52	4-4-0	16x20″	Scrap—1882
16	Lucien Tilton	Boston L. W.	# 486	11-7-53	4-4-0	15x24″	
16	R. M. Pulsifer	Rhode Island	#1404	1883	4-4-0	18x24″	FRR 216-25-152 B&M 952
17	Jaffrey	Souther	—	1853	4-4-0	?	
17	Jaffrey	Hinkley & Wms.	—	1867	4-4-0	16x24″	FRR 217
18	Marlborough	Boston L. W.	# 500	2-1-54	4-4-0	15x24″	FRR 218
19	C. W. Cartwright	Hinkley & Wms.	—	1865	4-4-0	?	FRR 219
20	Troy	Schenectady	# 366	1865	4-4-0	?	FRR 220
21	John Elliott	Hinkley & Wms.	—	1865	4-4-0	?	FRR 221
22	Murdock	Cheshire R. R.		1868	4-4-0	16x24″	FRR 222
23	R. Stewart	Manchester	# 132	10-23-68	4-4-0	16x24″	FRR 223-88
24	Peterborough	Hinkley & Wms.	—	1869	4-4-0	16x24″	FRR 224
25	F. A. Perry	Cheshire R. R.		1870	4-4-0	16x24″	FRR 225
26	Samuel Gould	Cheshire R. R.		1870	4-4-0	16x24″	FRR 226
27	W. A. Brigham	Hinkley & Wms.	—	1870	4-4-0	16x24″	FRR 227
28	Fitchburg	Cheshire R. R.		1871	4-4-0	16x24″	FRR 228
29	Ashburnham	Cheshire R. R.		1873	4-4-0	16x24″	FRR 229
30	Bellows Falls	Hinkley & Wms.	—	1873	4-4-0	17x24″	FRR 230
31	Monadnock	Cheshire R. R.	—	1875	4-4-0	17x24″	FRR 231
32	Wm. A. Russell	Rhode Island	#1005	1881	4-6-0	19x26″	FRR 232-251-307 B&M 1047
33	E. C. Thayer	Rhode Island	#1006	1881	4-6-0	19x26″	FRR 233-252-308 B&M 1048
34	Not Named	Rhode Island	#2138	1889	2-6-0	19x24″	FRR 234-192-226 B&M 1001
35	Not Named	Rhode Island	#2139	1889	2-6-0	19x24″	FRR 235-193-227 B&M 1002
36	Not Named	Rhode Island	#2326	1890	4-6-0	18x24″	FRR 236-261-300 B&M 1040
37	Not Named	Rhode Island	#2327	1890	4-6-0	18x24″	FRR 237-262-301 B&M 1041

MOUNT WASHINGTON RAILWAY

The Mount Washington Railway has the distinction of being the first rack railroad built in the world. The road was chartered on June 25, 1858, in the State of New Hampshire, to build a railroad from the base station to the summit, a distance of 3.17 miles. Work was not commenced, however, until May, 1866 and a satisfactory trial was made over the ¼ mile stretch in August of that year. The road was not completed to the summit until 1872.

The road was promoted by Sylvester Marsh and is termed the "Marsh System". The track was originally laid with 2x½″ strap iron fastened on 6x7″ longitudinal timbers, laid flat on the cross ties. It was 4′-7½″ gauge and "T" rails are now used. The rack rail consists of 2-3x3x⅜″ angles placed back to back between the rails, 4″ apart, with 1-½″ pins, 4″ center to center for the rack teeth. The line commences 2668 feet above sea level and ascends 3625 feet, making an average of 1290 feet per mile. The maximum grade is 1980 feet or 37.5%. There are nine curves varying from 497 feet to 945 feet.

The first engine was named the "Hero", nicknamed "Peppersass" on account of its high stack. It was built by Campbell & Whittier of Cambridgeport, Mass., in 1866. The boiler was hung on trunnions in order that it might remain in a vertical position on any grade. Steam connections and feed pipes were made through these trunnions. The cylinders were carried outside the frames, carried on four wheels and drove a crank shaft geared to the driving shaft. The gear on the shaft engaged the rack rail. The Boston & Maine assumed operation on June 29, 1895, through control of the Concord & Montreal R. R. Mr. Yeaton gives the following engines on the Mt. Washington Ry.

1	Hero	Campbell & Whittier	1866	8x12"	2 cyl. 4 wheels	U
1	Falcon	Manchester	1883	8x12"	4 cyl. 4 wheels	H
			Formerly #7			
2	George Stephenson	Walter Aiken	1869	10x16"	2 cyl. 4 wheels	U
2	Eagle	Manchester	1878	8x12"	4 cyl. 4 wheels	H
			See Note.			
2	Atlas	Manchester	1875	8x12"	4 cyl. 4 wheels	H
			Formerly #4			
3	Hercules	Walter Aiken	1869	10x16"	2 cyl. 4 wheels	U
			Rebuilt.			
	Hercules	Manchester	1874	8x12"	4 cyl. 4 wheels	H
4	Atlas	Walter Aiken	1870	10x16"	2 cyl. 4 wheels	U
			Rebuilt.			
	Atlas	Manchester	1875	8x12"	4 cyl. 4 wheels	H
			See Note.			
4	Not Named	Manchester	1883	8x12"	4 cyl. 4 wheels	H
			See Note.			
5	Cloud	Walter Aiken	1870	10x16"	2 cyl. 4 wheels	U
			Rebuilt.			
	Cloud	Manchester	1876	8x12"	4 cyl. 4 wheels	H
			See Note.			
5	Not Named	Manchester	1883	8x12"	4 cyl. 4 wheels	H
6	Tip Top	Manchester	1874	8x12"	4 cyl. 4 wheels	U
			Rebuilt.			
		Manchester	1878	8x12"	4 cyl. 4 wheels	H
7	Falcon	Manchester	1883	8x12"	4 cyl. 4 wheels	H
7	Not Named	Manchester	1895	8x12"	4 cyl. 4 wheels	H
8	Pilgrim	Manchester	1892	8x12"	4 cyl. 4 wheels	H
8	Not Named	Manchester	1908	8x12"	4 cyl. 4 wheels	H

U = Upright boiler, H = Horizontal boiler

NOTE: The "Eagle", Manchester, 1878, the rebuilt "Atlas", Manchester, 1875, the rebuilt "Cloud", Manchester, 1876 and the "Falcon", Manchester, 1883 were burned in a fire at the Lyndonville, Vermont, shops, where these engines were repaired, in 1895. The "Eagle" and the "Cloud" were scrapped, the other two engines were repaired and renumbered as shown on Mr. Yeaton's list.

BOSTON & MAINE MOTIVE POWER

1900-1935

In concluding this series of articles on Boston & Maine locomotives and its subsidiaries it might be well to include a list of locomotives, under the present system of renumbering which was inaugurated in 1911 without reference to the old numbers. While some of these locomotives have already been shown in the replacements in the previous lists, the following list may be of value to our members.

Until recently, locomotives assigned to the Sullivan County and Vermont Valley roads carried the name of the individual road and was numbered in a separate series. A short time ago the Boston & Maine R. R. abandoned this system. The majority of the smaller engines were probably scrapped but the five Atlantic type and three Pacific type engines were ineluded with the same elasses of engines on the Boston & Maine R. R.

56	B	Baldwin	1903	16x24″	51″	91000
61	F-10	Baldwin	1901	16x22″	47″	75400
170- 175	G-9b	Manchester	1900	18x24″	51″	100000
180- 185	G-9b	Manchester	1901			
190- 199	G-9c	Baldwin	1903	18x24″	51″	100000
200- 209	G-10	Manchester	1903	19x24″	51″	114000
210- 219	G-10	Manchester	1904			
220- 229	G-10	Manchester	1905			
230- 249	G-10	Manchester	1906			
250- 264	G-10	Manchester	1907			
265- 279	G-10	Manchester	1908			
280- 289	G-10	Manchester	1909			
290- 309	G-10	Manchester	1910			
400- 419	G-11a	Manchester	1911	19x26″	51″	140000
420- 429	G-11a	Manchester	1913			
430- 452	G-11b	Brooks	1916	20x26″	51″	150000
600- 601	H-1a	Schenectady	1916	25x30″	57″	229000
610- 632	H-2a	Schenectady	1922	25x28″	52″	221000
640- 649	H-3a	Baldwin	1927	23x28″	52″	244800
650- 654	H-3b	Baldwin	1929	23x28″	52″	243200
944- 949	A-40b	Manchester	1900	18x24″	72″	116800
950- 956	A-41a	Manchester	1900	18x24″	69″	115000
957	A-41b	Manchester	1900	18x24″	69″	115000
960- 969	A-41c	Baldwin	1903	18x24″	69″	115000
970- 979	A-41d	Manchester	1904	18x24″	69″	115000
980- 983	A-41e	Manchester	1905	18x24″	69″	115000
990-1009	A-41f	Manchester	1909	18x24″	69″	123600
1010-1029	A-41f	Manchester	1911			
1165-1168	A-45	Schenectady	1900	19x26″	72″	126000
1170-1173	A-46	Baldwin	1900	19x26″	72″	126000
1360-1389	B-15	Manchester	1903	19x26″	63″	142400
1390-1407	B-15	Manchester	1905	(Some of these		
1410-1430	B-15	Manchester	1906	B-15 engines		
1435-1459	B-15	Manchester	1907	were reclassified		
1460-1479	B-15	Schenectady	1909	as B-15b).		
1480-1499	B-15	Manchester	1910			
2020-2025	C-15c	Rhode Island	1900	19x26″	62″	138000
2050	C-15b	Schenectady	1900	19x26″	66″	146000
2051-2055	C-16a	Schenectady	1900	19x26″	62″	141000
2060-2064	C-17	Rhode Island	1900	19x24″	69″	137000
2076-2079	C-20	Baldwin	1900	20x26″	62″	158000
2100-2109	C-21d	Schenectady	1904	20x26″	72″	179000
2110-2117	C-21d	Schenectady	1905			
2120-2126	C-21e	Schenectady	1906	20x26″	72″	179000
2129	C-21c	Schenectady	1906	20x26″	72″	170400
2310-2329	K-5a	Schenectady	1901	20x30″	60″	165000
2320-2343	K-5b	Schenectady	1902	20x30″	60″	165000
2350	K-6b	Schenectady	1901	20x30″	60″	178000
2351-2359	K-6b	Schenectady	1902			
2360-2365	K-7	Schenectady	1905	20x30″	60″	170000
2370-2380	K-7	Schenectady	1906			
2381-2389	K-7	Schenectady	1907			

2390-2399	K-7a	Schenectady	1907	20x30″	60″	171200
2400-2429	K-7c	Schenectady	1910	20x30″	61″	188100
2600-2639	K-8d	Baldwin	1911	22x30″	61″	214900
2640-2689	K-8b	Baldwin	1913	24x30″	61″	219400
2690-2709	K-8b	Schenectady	1913			
2710-2734	K-8c	Brooks	1916	24x30″	61″	219400
2910-2917	L-1b	Rhode Island	1900	20x28″	54″	168000
3000-3019	S-1a	Schenectady	1920	29x32″	61″	377800
3020-3029	S-1b	Schenectady	1923	29x32″	61″	372100
3204-3209	J-1	Schenectady	1902	19x28″	79″	159600
3210-3219	J-1a	Schenectady	1907	19x28″	79″	170400
3220-3226	J-1b	Manchester	1908	19x28″	79″	170400
3227-3239	J-1c	Manchester	1909	19x28″	79″	181600
3240-3244	J-1b	Manchester	1908			
3600-3611	P-1a	Schenectady	1910	22x28″	73″	236700
3620-3659	P-2d	Schenectady	1911	22x28″	73″	247700
3660-3679	P-2b	Schenectady	1913	22x28″	73″	247700
3680-3689	P-2c	Schenectady	1916	22x28″	73″	247700
3700-3709	P-3a	Schenectady	1923	24x28″	73″	249340
3710-3714	P-4a	Lima	1934	23x28″	80″	339200
4000-4019	T-1a	Lima	1928	27½x30″	63″	393000
4020-4024	T-1b	Lima	1929	28x30″	63″	403000
4100-4104	R-1a	Baldwin	1934	28x31″	73″	409000
5000-5004		Baldwin	1911	2-4-4-2	electric	
5005-5006		Baldwin	1917	2-4-4-2	electric	

The dimensions given are cylinders, diameter of drivers and weight of engine.

WHEEL ARRANGEMENT

A=4-4-0; B=2-6-0; C=4-6-0; F=0-4-0; G=0-6-0; H=0-8-0;
J=4-4-2; K=2-8-0; L=4-8-0; P=4-6-2; R=4-8-2; S=2-10-2; T=2-8-4.

During the last decade the Boston & Maine management has spent considerable money in modernizing, by means of equipping the more recently built locomotives with such devices as feed water heaters, superheaters, boosters, power reverse gears and thermic syphons. Some of the older engines are still in service, on the light runs, but the march of time has caused the majority of the older engines to be scrapped.

(This is the concluding article in this series of Boston & Maine R. R. locomotives.)

Our Exchange Department

We are calling the attention of our newer members to this department—under the jurisdiction of Mr. Parker, our Exchange Manager. Three albums are made up each year and follow a circuit made up of our members desiring to receive them. No prints are allowed to be removed —nor should any be added when these albums are received. The name of the exhibitor is with each print and our members should write to the exhibitors for such prints as they desire. A satisfactory means of exchange can usually be found. This method insures every member the opportunity of seeing the original make-up of an album and is the fairest and safest means of exchange yet provided. The albums go at parcel post rates. Any of our members who desire to exhibit prints or who wish to be placed upon our circuits are urged to get in touch with Carlton Parker, Exchange Manager, 45 Warren St., Newton Centre, Mass.

The Tennessee & Alabama R. R.

(Report on the Conditions at the close of the Civil War)

THERE have been a great many documents issued by our Federal Government touching on the importance of the railroads in time of war and their condition at the close of the Civil War. A study of the reports made to the stockholders by the railroads reveals some interesting statements. The Report of the Tennessee & Alabama R. R. for the year 1866 is so full and complete that it should be of interest to our readers. What took place on this road occurred on the others—the only difference being in the names. Conditions were pretty much the same on all of the roads at the end of the conflict.

While the majority of us hope we will never see another conflict in this land or any other one may well wonder if the majority of our people who prefer to ride in "rubber-tired" vehicles some day will not regret their present day lack of interest in the railroad problem. One of our high army officers has stated that the majority of the highways built in recent years would soon crumble and give way to the strains caused by an army and its equipment. One might well wonder that with the miles of railroad which have been and probably will be abandoned that some future generation may wish they were available for service!

To the Stockholders of the
Tennessee and Alabama Railroad Company.

Gentlemen:—In compliance with the requirements of your charter, the Board of Directors submit the following report of the condition and operations of the road for the year ending June 30th, 1866:

At the last annual meeting of the Stockholders, your road had been in possession of the Federal Government ever since March, 1862, and was, at the time of your meeting in August last, controlled and operated by Military authority. The Passenger and Freight houses near Broad street in Nashville, together with your Rail Road Office at that place, on Summer street, had all been removed or destroyed, and your Depot grounds at that place, were principally covered and occupied by an immense ware-house, known as the Taylor Depot, erected by military authority of the Federal Government, in which were deposited military stores. Your Work Shops, Engine House, and all machinery and tools from your Work Shops, had been removed by military authority, and the houses taken down for the use of the Government, as we understand.

Our Rail Road bars, which had been taken up from the track and brought together at the junction with the Nashville & Chattanooga Rail Road, for the purpose of being sent to Atlanta to be re-rolled, were taken by the Government, as we understand, for case-mating the fortifications. The new rails, which had been but recently re-rolled, a part of which were at the Station near the Work Shops, and a portion at Columbia, were likewise taken and used for some purpose. Nearly all of the station houses, depot buildings, water tanks, &c., along the line of the road, had been either moved or destroyed.

Many of the bridges were destroyed during the war, and at that time, were supplied with temporary structures, and since, a better class of bridges have been constructed, but not equal to our former substantial bridges, made of stout and durable materials. The present bridge across Duck River, is a Deck bridge, in the place of an elevated through bridge as formerly, and on account of its distance above water, is liable to be carried off by extreme high water.

The light timber out of which this bridge is constructed, does not justify the expense of having it raised, and consequently it was deemed advisable by the Superintendent to postpone any change, until a new bridge was needed, and then recommends that an iron bridge be substituted, which, from experience, all things con-

sidered, may prove to be the best economy, though costing a larger amount in the first instance.

On that portion of the road from Columbia to Mount Pleasant, the entire superstructure has been removed by the authority of the Federal Government in the year 1864, including all the rails, frogs, switches, spikes, and cross ties. We think it was done to repair or to rebuild some other road. After the road was taken possession of by military authority, nearly all our entire rolling stock, including cars and locomotives, have been lost or destroyed. The locomotive Franklin, while in the use of the Federal authority, was blown up. The Columbia is nearly worn out and useless. The other four locomotives have been or are now being repaired. Two of them, we believe, have been in use for some time. Only two or three cars of any use have ever been recovered out of our entire original stock. Many of the rails were badly worn on account of the great number of heavy locomotives and large trains which had passed over our track between March, 1862 and September, 1865, and such rails as were most damaged, have been taken up and other rails substituted in their place. Some rails now require to be replaced with new ones. Such is a brief history of what was the situation and condition of your road, as regards the original property thereof, when you elected the Board of Direction in August last. A greater portion of the injury and loss of the property of the road, has happened since the officers and agents of the road ceased to control and operate it in March, 1862, at which time the Federal army took possession at Nashville, and your road turned over and taken possession of by the authorities of the Federal Government.

In a few days after the organization of the Board of Direction, the President of the Board visited Washington City, and made known to the Government the situation and condition of your road, and the damages the Company had sustained. He filed his application for compensation in the Quarter Master's Department, a branch of the War Department. In answer to the application, the Department admitted the correctness of the statement, that the army had used and consumed the materials as set forth in the petition, but said it was a case which "seemed to be one coming under the acts of Congress providing for appointment of Commissioners by the President, to adjust claims of Rail Roads destroyed, injured or used." A separate statement and petition was made in relation to the Rail Road iron, cross ties, &c, taken or removed from that portion of your road between Columbia and Mount Pleasant, receiving in reply an endorsement that the facts stated were true and correct, as set forth in the petition, but no provision for the payment of the claim was made, further than before suggested.

Direct application, in the form of petition, was then made to the President of the United States, asking him to make such orders or grant such relief, as in his judgment the necessity required.

That case is still pending, and we are in hopes, that the Government will either have the superstructure replaced on that portion of our road, or pay a sufficient sum of money in the way of damages, to have it repaired. We cannot, nor should not, believe or entertain the opinion, that a great and just Government, would use or consume the private property of its citizens for the public good, and not pay a fair and just compensation therefor. Especially should we expect it of such a Government as the United States, with a written constitution, in which there is a special provision, as contained in article 5th, as amended, in these words: *"nor shall private property be taken for public use, without just compensation."* You will bear in mind the words just quoted are the supreme law of the land, and all the people, including all the officers and agents of the Government of the United States, are bound, and in good faith required, to observe and be governed by it.

We should not despair, so long as said Constitution exists or remains unaltered, but cling to it as a sheet anchor of safety, justice and protection.

On the 8th of August, 1865, the Hon. E. M. Stanton, Secretary of War, by order of the President, addressed the following letter of instructions to Major General George H. Thomas.

HEAD QUARTERS MILITARY DIVISION OF THE TENNESSEE,

Nashville, Tennessee, August 21st, 1865,

GENERAL ORDERS,
No. 20

The following letter of instructions, just received from the War Department, is published for the information of all concerned:

WAR DEPARTMENT
WASHINGTON CITY,
August 8th, 1865.

Major General George H. Thomas,
Commanding Military Division of the Tennessee,
Nashville, Tennessee.

General: It having been determined by the Government to relinquish control over all railroads in the State of Tennessee, and their continuations in adjoining States that have been in charge of, and are now occupied by the United States Military authorities, and no longer needed for military purposes, you are hereby authorized and directed to turn over to the respective owners thereof, at as early a date as practicable, causing in all cases of transfer as aforesaid, the following regulations to be observed and carried out:

1. Each and every Company will be required to re-organize, and elect a Board of Directors, whose loyalty shall be established to your satisfaction.

2. You will cause to be made out in triplicate, by such person or persons, as you may indicate, a complete inventory of the rolling stock, tools and other materials and property on each road.

3. Separate inventories will be in the same manner made of the rolling stock, and other property originally belonging to each of said roads, and that furnished by and belonging to the Government.

4. Each Company will be required to give bonds satisfactory to the Government, that they will, in twelve months from the date of transfer, as aforesaid, or such other reasonable time as may be agreed upon, pay a fair valuation for the Government property turned over to said companies, the same being first appraised by competent and disinterested parties, at a fair valuation, the United States reserving all Government dues for carrying mails, and other services performed by each Company, until said obligations are paid; and if, at the maturity of said debt, the amount of Government dues retained as aforesaid does not liquidate the same, the balance is to be paid by the Company in money.

5. Tabular statements will be made of all expenditures by the Government for repairing each road, with a full statement of receipts from private freights, passage, and other sources, also a full statement of all transportation performed on Government account, giving the number of persons transported, and amount of freight, and the distance carried in each case, all of said reports or tabular statements to be made in triplicate; one each for the Secretary of War, the Military Head-Quarters of the Department, and the Railroad Company.

6. All Railroads in Tennessee will be required to pay all arrearages of interest due on the Bonds issued by that State prior to the date of its pretended secession from the Union, to aid in the construction of said roads, before any dividends are declared or paid to the stockholders thereof.

7. Buildings erected for Government purposes on the line of railroads, and not valuable or useful for the business of said companies, should not form a legitimate charge against such companies, nor should they be charged for rebuilding houses, bridges or other structures, which were destroyed by the Federal army.

8. You are authorized to give any orders to Quarter-masters within your Division, which you may deem necessary to carry into execution this order.

By order of the President

(Signed) EDWIN M. STANTON,
Secretary of War.

In accordance with the requirement contained in paragraph IV.,
Bvt. Maj. Gen. Z. B. Tower, U. S. Vols.;
Col. Wm. E. Merrill, 1st Reg. U. S. V. V. Engrs.:
Albert Fink, Esq., Louisville, Ky.;
Walter McQueen, Esq., Sup't. Schenectady Locomotive Works; and
J. F. Farnsworth, Esq., Madison, Indiana,
are appointed a Board of Appraisers, with Bvt. Maj. S. C. Kellog, as Recorder for the Board. It shall be the duty of the Board, in compliance with the directions

given in paragraph IV., to assess, at a fair valuation, all Government Railroad property, to be disposed of under the provisions of the foregoing letter of instructions. The Board of Appraisers will assemble in the city of Nashville, at 10 o'clock A. M., Sept. 1st, 1865, or as soon thereafter as practicable, and will continue their sessions at this and such other points within this Military Division, as the duties upon which they are called together may require.

By command of Maj. Gen. Geo. H. Thomas.

WM. D. WHIPPLE,
Brig. Gen. and Assistant Adjutant General.

OFFICIAL:
ROBT. H. RAMSEY, *Ass't. Adj't. Gen.*

Under the order of the 8th of August, the Secretary, about the 4th of September, reported the names of the members of the Board of Direction of the Tennessee & Alabama Railroad Company to Gen. Thomas, and he expressed his satisfaction of the loyalty of the Board you had selected.

Under the 4th section of the letter of instructions of the 8th of August, above mentioned, we purchased of the United States Government for our Company, the following described quantity of rolling stock and materials, viz: Three Locomotives, Numbers 124, 182 and 184, costing the aggregate $51,000. Thirty-four box cars, cost $28,084, Fourteen flat cars, cost $9,100, and one passenger car at $2000 cost. The whole amount of purchase of cars is $39,184. For necessary articles about the Superintendent's office, such as Iron Safe, Letter Press, Hc., $143. We purchased the necessary fixtures along the line of the road such as Pumps, Pipes, Water Tanks, cord wood, and houses along the road and at Nashville, amounting in all to $18,364.92. The sum total for which the Company's separate Bond was executed to the United States Government for property purchased, was $108,691.92.

For the purchase of operating the road economically and profitably, The Board of Directors of the Tennessee and Alabama Railroad Company, made the arrangement and entered into an agreement, with their Executive Committee, with the Central Southern and the Tennessee and Alabama Central Railroad Companies, to operate jointly the whole line of road from Nashville to Decatur, according to the terms of the following agreement:

NOTE: We are not so much interested in the terms of agreement that went to form the Nashville and Decatur Railroad Line, as we are in the report of the Superintendent of the Tennessee & Alabama Railroad which is as follows:

JOHN S. CLAYBROOKE, *President Tenn. Ala. R. R.*

Sir: Herewith I submit a statement of the operations of the Tennessee and Alabama Railroad from September 15th, 1865 to July 1st, 1866:

The income has been	$250,098.04
Expenditures for same period	124,606.49
Net Earnings	125,481.51
Mail service due and unpaid	2,343.75
Total Net Earnings	127,825.30

Showing the expenditures to be about 49.23 hundredths of the gross earnings.

The cost of repairs, maintenance of track, bridges, freight and passenger houses and locomotives, and passenger cars purchased from other roads, purchase of wheel press, and all other expenditures essential to the operations of the road, are embraced in the general expense of the road account. The expenditures from September 15th, 1865, to Jan'y 1st, 1866, appear small when compared with the expenditures since that date, from the fact that up to January 1, 1866, but little had been done to place the road in independent working order, and hence but small disbursements were made aside from the Pay Roll.

Nearly all the debts of the road, made by the rolling stock being repaired by the Nashville & Chattanooga Railroad Shops, damaged and lost freight from Sept. 15th,

1865, to January 1st, 1866, have since been paid, and are included in the expenditures. The Tennessee and Alabama Railroad, as well as the other roads comprising the Line, lost heavily from the frequent breaks in the Central Southern Railroad, caused by the high water of last winter. Through freight and passenger business was, in a measure, suspended for thirty days, in consequence of which the Tennessee and Alabama Railroad was confined to local business for that length of time.

ROLLING STOCK—During the last six months the Locomotive Engines, Nashville and Williamson, have been thoroughly re-built at a total cost of about three thousand ($3,000) dollars. All of the locomotives belonging to this Company have been brought to Nashville, except the Columbia, which is at present at Memphis, Tenn., in a condition hardly worth repairs. It will cost about $150.00 to bring her to Nashville, and I would respectfully recommend that the Engine be disposed of at Memphis, from the fact that it will cost more to repair her than she will be worth to this company when repaired. The engine Franklin was exploded while in the service of the United States Government, and the wreck remains in the Government Yard at Nashville, having never been repaired by the Company. Engines Nos. 1, 6, 182, 26, 124 and 184, are in good running order. Engines originally called Nashville and Williamson and John Childe, have been changed to Nos. 1, 6 and 26. The freight and passenger cars belonging to the Tennessee and Alabama Railroad Company and the Line, are being thoroughly repaired, and by October 1st, 1866, all cars of the Line will be in good working order.

STATION HOUSES—During the last four months, good and substantial Station Houses have been built at Carter's Creek, Spring Hill and Thompson's Station, at an average cost of about $600.00 each. A Freight Depot has also been built at Nashville, 40x162, at a cost of about $300.00, which will answer the demands of the road perfectly.

TRACK AND BRIDGES—The track is in good and safe condition, but needs some new iron. We have, however, perfected machinery at our Shops, for the purpose of straightening all the burnt and crooked iron along the road, and in this manner will secure enough to meet the present demands of the road.

The Bridges and Trestles are in good and safe order. Arrangements have been made to erect a Beard Truss Bridge over Little Harpeth. Having sufficient Lumber on hand for the purpose, the cost will be confined to labor and bolts, and the labor can be performed by men already employed in the Department. Having consulted with several leading Bridge Builders and Engineers in regard to the liability of the Duck River Bridge being carried away by high water, I am convinced that there is no great danger to be apprehended during the life of the present structure. I would, however, say, that should a great flood come, such as occurs only at long intervals, the bridge would be greatly endangered, and possibly destroyed. In view of this fact, I would respectfully suggest that, as soon as the company is able, the present structure be removed and a thorough Iron Bridge erected in its stead, and as fast as it is necessary to renew other bridges, that iron structures be erected. Structures of this kind once erected, and receiving the proper care, are permanent and valuable.

The supply of wood purchased from the Government is about consumed. Arrangements have been made for another supply. The supply of ties on hand will meet the demands of the road for the present year.

PASSENGER TRAFFIC—We have completed the arrangements for the sale of through tickets to all important points South of Decatur and check baggage through to all points to which tickets are sold. The system works admirably. I am inclined to believe that the time has arrived when it would further the interest of the Company to place commutation tickets on sale between Nashville and Columbia, at the usual discount of 20 per cent for such tickets, and I would be pleased to have the decision of your board in relation to the matter at an early day. I have arranged with Mr. W. J. Ross, General Superintendent of the M and C Railroad for an exchange of passenger coaches at Decatur, for the accommodation of travel beyond that point. By this arrangement we avoid the necessity of one change of cars, which offers superior inducements to the travelling community, and enables us to successfully compete with Southern lines.

In the management of trains for the past year, but two accidents, resulting in the loss of life, have occurred. On the 16th of October, 1865, at the crossing near Easton Depot, a wagon containing Penitentiary convicts was run into by a passenger

train going South, and by the accident, one convict was killed and another injured, although every effort was made on the part of the train men to avoid a collision. One brakeman was fatally injured at Franklin, in February last, while in the act of coupling cars. The road has been managed free of accidents to passengers, and no damage of importance has been sustained to rolling stock since the 1st of January, 1866.

The operating expenditures are reduced to the actual necessities of the road. In conclusion, I beg that you may excuse imperfections of this report, and I trust that I may be able to present my next annual report in a more perfect and concise manner. Not being connected with the road until December 26th, 1865, and my predecessor having no record of the operations of the road from September 16th, 1865, up to the date of his resignation, I find myself without necessary data to make a complete report.

Respectfully submitted,

J. B. VANDYNE, *Gen. Sup.*

(The above appears in the Annual Report of the President and Directors of the Tennessee & Alabama Railroad to the Stockholders.)—1866.

The Society is indebted to the kindness of Mr. Jno. M. Scott, Secretary of the Louisville & Nashville R. R. for the loan of this report and permission to reproduce it in our bulletin.

The Royal Scot

The L. M. S. Railway of England locomotive Number 6100 "Royal Scot", which visited Canada and the United States with the L. M. S. Royal Scot train in 1933, still forms an Anglo-American link since it is used, at the time of writing, for working express trains between London (Euston terminal) and Liverpool; thus many American visitors to Britain who travel via the port of Liverpool ride behind it. Number 6100 usually works the 10.40 a. m. express from Euston to Liverpool and returns with the 5.25 p. m. Special Limit train. The latter is booked to cover the 152.7 miles from Crewe to Willesden (London) in 142 minutes start-to-stop, at an average speed of 64.5 m.p.h.

This locomotive still carries the bell which it used on its American tour, also special nameplates commemorating the trip. The wording on the latter was prepared by our member, Mr. D. S. Barrie, and reads:

"ROYAL SCOT"

"This locomotive with The Royal Scot train was exhibited at the Century of Progress Exposition, Chicago, 1933, and made a tour of the Dominion of Canada and the United States of America. The engine and train covered 11,194 miles over the railroads of the North American Continent and was inspected by 3,021,601 people. W. Gilbertson, Driver; J. Jackson, Fireman; T. Blackett, Fireman; W. C. Woods, Fitter."

High-Liners

By Arthur Curran

A PHILOSOPHER once remarked that you cannot take more out of life than you put into it. To show that this idea applies to locomotives, as well as to men, is one of the main objects of this article.

At the turn of the century, the railroads now known as the New York Central Lines were experimenting with new engines. At that time, anything with a wide firebox supported on a trailing truck was considered "new." In fact, engine crews called them "trailers".

In 1901, the New York Central adopted the Atlantic type and stuck to it until 1908. In that seven-year period, the road bought a large number of engines of this type.

The Michigan Central, however, bought only a few Atlantics, and soon concentrated on the Pacific type. This was a very wise move, as the Pacific has a much greater range of usefulness due to its superior hauling capacity.

The fast trains of the Michigan Central—especially on the Canada Southern Division—were known as "high-liners," and frequently required sustained speeds of 70 m.p.h. or more. Atlantic engines were fast enough—after you got them going!—but were slippery and slow in starting. Moreover, they were very unsatisfactory on heavy jobs or could not handle them at all.

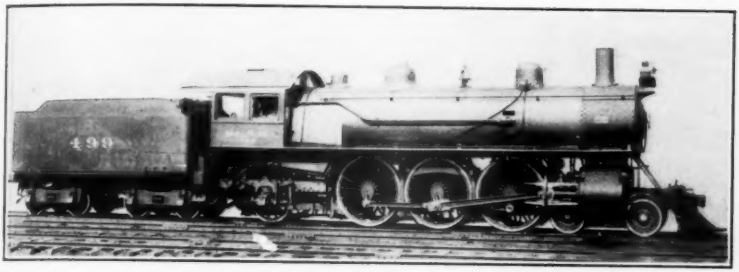
The Pacific engines could—and did—handle any passenger job calling for speed with a heavy load. They maintained speed, mile after mile, with smoothness and consistency. Of course, they were well cared for, and properly run and fired. That fact is of importance and worth remembering. "You cannot take more" . . . .

The first Pacifics for the Michigan Central were built by Schenectady with 22x26 inch cylinders, 75 inch drivers, 72 inch straight boiler, 200 lbs. steam and weight of 221,000 lbs. The class is illustrated by No. 499, shown herewith. It will be seen that she had Stephenson link motion and the style of piston valves then popular. This was in 1904, but the main features of the design survived in subsequent classes for a number of years. The principal changes were the use of larger grates and the eventual adoption of Walchaert gear with the style of valves suited to that gear. The later classes were heavier, too; but, in the main, much the same. The old Pacifics were not re-built, and lived out their lives as originally designed.

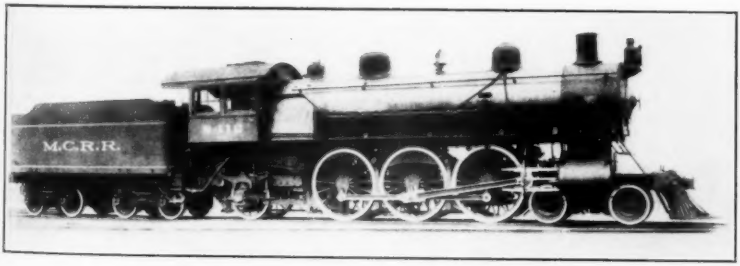
This article is concerned only with the early Pacifics having Stephenson motion. Among the finest of them were those built at the Montreal Works, and of which two examples are presented herewith, both numbered in the N. Y. C. Lines series.

No. 8412 was built in 1905, and is of interest as showing the road's initials lettered on the tank.

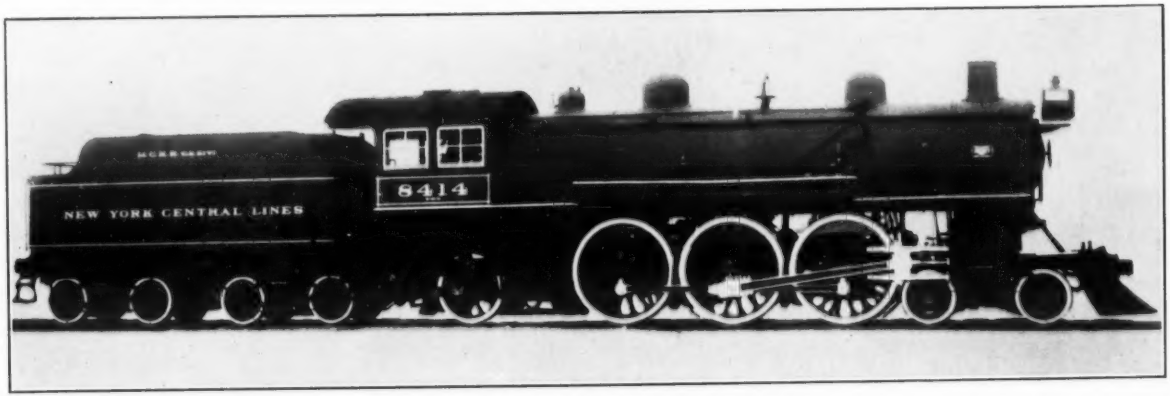
No. 8414 was built in 1906, and illustrates the standard lettering and striping of the period. In some respects, this engine is the handsomest



Michigan Central R. R. #499. Schenectady, 1904.



Michigan Central R. R. #8412. Schenectady, 1905.



Michigan Central R. R. #8414. Schenectady, 1906.

of the three. Certainly, it exhibits great refinement, and the tank is so proportioned as to give a very modern and "snappy" appearance. In fact, taken altogether, the whole outfit compares very favorably with the best practice of today, so far as appearance goes, and is a credit to the Montreal Works and the Michigan Central Railroad.

It was one of these Montreal Pacifics that gave the author a lively ride in August, 1908, from St. Thomas to Victoria Park. The train was not exceptionally heavy, even for those days; but the engine was assigned to a tough job out of Buffalo on her return trip.

"You know the road," said the engineer, "So just use your watch and see this engine average 70 all the way."

She did, too—and without any fuss. There is no doubt, either, that she waltzed that tough job out of Buffalo in easy style.

That engineer was a stocky, clean-shaven man, ruddy as a sailor from the Ontario breezes that blew in at the cab window. Rather stiff at St. Thomas, he became genial after a little conversation about the engine. Boy, that engine!

The Canada Southern was—and is—a beautiful road. Smooth, level and nicely laid, the tangent stretches for miles and miles to make the greatest race-track on the American Continent.

Over these miles of unsurpassed excellence, the "high-liners" have run all these years without the accompaniment of bombast and ballyhoo. When heavier rolling-stock came in response to popular demand, heavier motive power was built to haul it. That is the simple truth, simply told.

The little straight-back Pacifics did well in their day, however, and now that day is gone. So, too, will ours—oh, so soon! Meanwhile, let us remember the locomotives of our younger days with kindness and appreciation. They helped to maintain a civilization which the pioneers started and which, let us hope, the choo-choo of today will perpetuate.

The First Twenty Years of Railroads in Connecticut

Under this title, Mr. Sidney Withington, our Vice President has prepared an interesting paper for the Tercentenary Commission of the State of Connecticut. The paper touches briefly and interestingly on the early railroads in the State of Connecticut and the map with opening dates is of real value to the reader. This little 32 page booklet, illustrated, is sold for 25c by the Yale University Press, New Haven, Connecticut. Applications for copies should be made to the Yale University Press.

The Silver Engine

By Rock Island

IN 1867, Paris, France, held its "Exposition International" and invited the world to send its latest mechanical creations. Included with these "creations" was the "Silver Engine", built by the Grant Locomotive Works, Paterson, New Jersey.

The engine, named "America", was reassembled within the vast hall of transportation. It was of the conventional 4-4-0 or "American" type but the boiler was jacketed of German silver and the trimmings, handles, whistle, pump, flagstaffs, headlight brackets were of pure silver. On the sides of the tender were portraits of General U. S. Grant. There she stood, during the exposition, confirmatory of the stories of the fabulous wealth of America as well as the winner of the Grand Prize.

Mr. Alan Manval, Purchaser of Supplies of the Rock Island Railroad, visited the exposition and the engine made a profound impression upon him. He cabled Mr. Tracy, then President of the road, and suggested the engine be purchased. The latter began negotiations with the result that the Rock Island acquired this famous engine upon the close of the exposition.

On May 11, 1869, the rails of the Rock Island R. R. reached Council Bluffs. On June 4th of that year, the "Silver Engine", gaily bedecked with ribbons, pulled out of the La Salle Street Station upon her maiden journey, with seven cars, carrying the officers and directors of the road, their wives and a number of prominent Chicago people. A daylight run was made to Davenport where the party rested for the night. The following day the trip was resumed to Council Bluffs, where the whole town turned out to welcome the coming of the special and to celebrate in a fitting manner the completion of the road. This special train was widely heralded by the newspapers and all along the entire route the people turned out to witness the passing of the special train hauled by this famous engine.

In 1871, the Government called for bids to handle the United States Mail westward from Chicago. The two competing roads were the Chicago & North-western and the Rock Island. The "Silver Engine", in charge of Thomas Holmes, an engineer of nineteen summers, beat the running time of the North-western by nine hours on the run from Council Bluffs to Chicago and twenty-seven hours on the westward run because the North-western train went into the ditch. The excitement along the route of the Rock Island was intense. Thousands of people lined the tracks. A flash of glistening white, the clear call of the silver whistle, a single note of the silver bell and the lad with his silver engine had come and gone!

In 1876 the Rock Island exhibited the "silver engine" at the Philadelphia Centennial. Stock certificates of the road carried a good likeness of this engine on their face. So far as we can learn the engine only carried one road number, that of 109.

For several years the engine continued in passenger service but there came a time when enginemen and hostlers grew weary of the constant

polishing needed to keep the silver from tarnishing and the superfluous gave way to the practical. She was stripped of her gaudy jacket and trimmings and from that time she remained only an engine of unusual beauty in the minds of those who had either ridden her or seen her. In later days she was assigned to hauling the pay train, a train which always brought a smile to the face of the weary railroader.

In the early part of this century, about 1905, Mr. George Heim, a florist of Blue Island, purchased what was left of this engine and moved it to his greenhouses. The boiler was then being used to run a water pump on the banks of the canal at the bridge just south of Blue Island. She had been damaged in an explosion and what remained of the once-famous "America" passed to the hands of Florist Heim for $85.00.

For five years, this boiler furnished steam which made the roses and carnations bloom in the Heim greenhouses. Then one day, she ceased to function and she was sold to a junk dealer who cut her to pieces and hauled her away. Then it was discovered that the boiler of the "America" was lined with copper! And thus marked the passing of this famous engine.

Pictures of this engine distributed by the Grant Works and by the Rock Island R. R., generally depict this engine as she was exhibited at Paris. Through the energy of one of our members, Mr. O. H. Means, he has produced a photograph of this engine as she was in service on the Rock Island R. R. The reader will note a difference in the stack and the fluted coupling roads have given way to the uniform cross section. The portrait of General U. S. Grant on the tender has given way to other decorations and the initials of the road have been added on the dickey. But other than this, the engine is the same and shows her in her original glory as she swept through those towns along the right of way with her clear whistle and beautifully toned silver bell.

The Pennoyer Colored Prints

To those of our members who are interested in owning a handsome set of colored prints of early American locomotives, we still have a number of sets on hand. The set includes "Snowbound"—a Crampton type of locomotive used on the Camden & Amboy R. R. in the fifties; the "Pioneer" of the Cumberland Valley R. R., built by Seth Wilmarth of Boston in 1851; "An American Express Train" drawn by a Rogers locomotive, built in the seventies; and, through the kindness of the Delaware & Hudson R. R. we are able to include the "Stourbridge Lion", imported from England by that road in 1829. The size of the "Pioneer" is 7x11″—the other three are 8¼x10½″. This size does not include the broad white margins. These reproductions were made from paintings by that talented artist and member of this Society—A. Sheldon Pennoyer. The price is $5.00 for the set of four prints and orders should be addressed to Chas. E. Fisher, 6 Orkney Road, Brookline, Mass.

An Important And Historic Transportation Route

By John H. Griffith

ON January 24, 1809, The New Castle & Turnpike Company was incorporated by the state Legislature of Delaware; a year later the Maryland Legislature passed an act giving the corporation a charter in the state. On January 30, 1811 a new charter was given the corporation with the title "New Castle Turnpike Co."

At first sailing packets transported passengers and freight between Philadelphia and New Castle on the Delaware River, and from the latter point a stage line was operated between there and Frenchtown wharf on Elk River, near Elkton, Md., a distance of about 17 miles. From Frenchtown sailing packets conveyed passengers, baggage and freight to Baltimore, a distance of 70 miles; connection being made at Baltimore with stage line to Washington, and also over the National Pike to Cumberland, Pittsburgh and other points west to the Ohio river.

In 1813 the first steamboat, the "Chesapeake" made its appearance, and was put on the run to Frenchtown; another steamboat the "Delaware", was put on the run between Philadelphia and New Castle. The coming of the steamboat heralded a most wonderful event, but they were slow at first making only about six or seven miles an hour.

General Lafayette came over this route from Philadelphia in 1824 when he last visited this country; a new and faster steamboat the "United States" met the general at Frenchtown, and with colors flying, proceeded to Baltimore where he was met by a flotilla of several steamboats and many other craft outside the harbor and escorted to the landing, which was a great and notable event of that time.

Henry Clay also came over this route in 1828 and received a great ovation when he landed in Baltimore on his way to Washington, and no doubt many other notable persons who figured in our national life of those times traveled over this important link of travel between the north and south enroute to Washington and other important places.

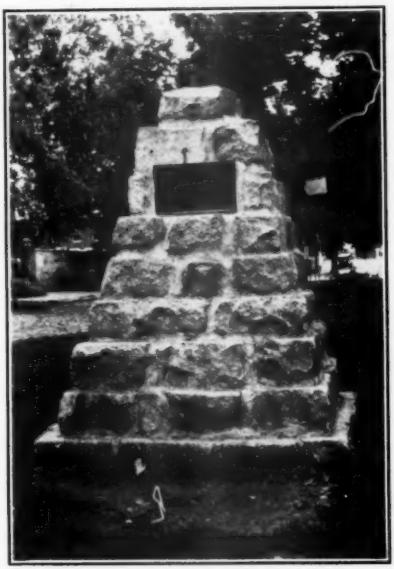
No railroad had reached the National Capital until 1835, when the Baltimore & Ohio built its line from Relay Junction near Baltimore to Washington.

On February 7, 1829, "The New Castle & Frenchtown R. R.", was chartered to build and operate a line of track from New Castle wharf on Delaware river to Frenchtown wharf, Cecil County, Md., a distance of about or near 17 miles. The roadbed construction consisted of thick blocks of stone about 20 inches square to which was bolted wooden sills or stringers, on which were fastened strips of iron about one inch thick, which served fairly well to horse drawn cars.

The new road was formally opened for service on July 4, 1831, with horse drawn cars which were used until the advent of the steam locomotive a little over a year later. The first steam locomotive the "Delaware" was purchased from the noted English builder, Robert Stephenson, but it was shipped knocked down and required about two months to assemble at New Castle. On September 10, 1832 the "Delaware" was

Oldest Ticket Office in the United States

The original ticket office of the old New Castle and Frenchtown R. R. now used as a watchmans house at R. R. crossing in New Castle.

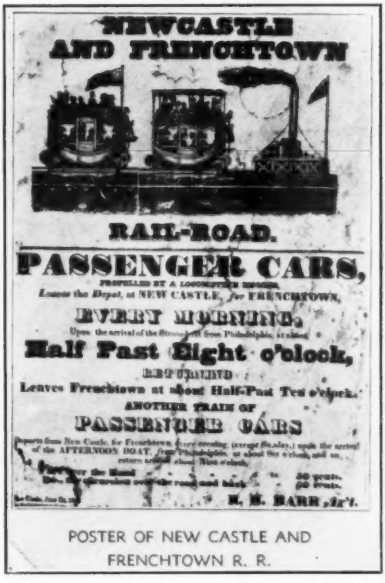


New Castle & Frenchtown R. R. Monument at New Castle, Del.

Erected of stone sleepers 20 inches square, on which a wooden sleeper was bolted on which was fastened strips of iron that bore the first trains of this early American Railroad.

Old Frenchtown hotel built in 1800 of brick.

A noted stopping place for stage passengers when waiting for the sailing packets and steamboats to arrive before the coming of the railroad.



POSTER OF NEW CASTLE AND FRENCHTOWN R. R.

placed in service, and on its trial trip it made the astonishing speed of 15 miles an hour, which was spoken of as a most wonderful event.

The stage line was discontinued between New Castle and Frenchtown, and shortly other locomotives were ordered from the Stephenson works; the "Pennsylvania", 9 tons; "Phoenix", 8 tons; were received late in 1832, the "Virginia", 9 tons, in 1833; the "Comet" in 1835. No drawings or pictures can be located of these early engines.

It was the first railroad to operate trains on schedule time in the state of Delaware, the eastern shore of Maryland or anywhere between Philadelphia and the Susquehanna river. For a few years it did an enormous business in passenger and freight traffic for so short a line, and paid a dividend as high as 40% during its best years. Early in 1838 the P. W. & B. R. R. was incorporated, and a few years later this early historic line was absorbed by this company.

It required about a whole day to make the trip from Philadelphia to Baltimore over this route, but when a new line was built from Philadelphia to Baltimore, with ferry service of one hour at Susquehanna river, the time between the two cities was reduced to five hours. After this the old New Castle & Frenchtown line began to suffer much loss in revenue, and by 1855 it was being operated with considerable loss to the company who decided to abandon that part of the line between Frenchtown and Delaware Junction in 1857. The steamboats operating at New Castle and at Frenchtown terminals were taken off and sold, and that part of the track from Delaware Junction to Frenchtown was taken up.

Frenchtown was a considerable village or town before the days of the stage line, and was burned by Admiral Cockburn of the British fleet, April 29, 1813. A large brick building of the residential type built in 1800 is still standing; it accommodated the stage passengers before the coming of the railroad. That part of the right-of-way of the old Frenchtown line from New Castle to Delaware Junction was retained, and became a part of the Delaware Railroad which began building operations down through the state of Delaware in 1853. The old road bed or grade can now be traced in many places across some of the farms in Delaware and Maryland.

Worth Reading

(Compiled by ELIZABETH O. CULLEN, *Reference Librarian*, Bureau of Railway Economics, Washington, D. C.)

—BOOKS AND PAMPHLETS—

After Fifty Years—The Western Railway Club, by C. L. Emerson, secretary, and committee: John Baker, chairman, Lorene Kindred, vice-chairman, L. R. Wink, J. W. Fogg, E. E. Thulin. 30 p. Chicago, Western Railway Club. "Supplement to 'After Forty Years' published in 1924-25."

The Centenary of the European Railways and Fifty Years Activity of the International Railway Congress Association—Notes and Remembrances. 53 p. Illus. Brussels, Belgium, International Railway Congress Association. "The First Railways—Their Establishment in the Different European Countries," pp. 5-26. History and development of the Association, pp. 27-48.

The Significance of the Pacific Railroads, by Carl R. Gray. 25 p. [Princeton, N. J.?, Princeton University?] The Cyrus Fogg Brackett Lecture, April 9, 1935.

Steel of Empire, by John Murray Gibbon. 423 p. Illus., Maps. Indianapolis, The Bobbs-Merrill Co. $3.50. History of the Canadian Pacific Railway.

They Built the West—An Epic of Rails and Cities, by Glenn Chesney Quiett. 569 p. Illus. $5. Denver, San Francisco, Los Angeles, San Diego, Portland, Tacoma, Seattle, and Spokane, are the cities to which detailed discussions are given.

Train Service Resumed Through the Nebraska Flood Area June 23, 1935—Story of the Cloudbursts in the Republican River Valley, by A. Cotsworth, Jr. 6 p. Illus., Maps. Chicago, Burlington Railroad, *Apply.*

The Wind Blew West, by Edwin Landham. 480 p. New York, Longmans, Green & Co. $2.50. A novel. The end-paper maps of Texas show the existing, and the proposed railroads, around which much of the action of the story took place.

—PERIODICAL ARTICLES—

"The Comet"—High Speed Train, by Karl Arnstein. Illustrated. Mechanical Engineering, August 1935, pp. 479-482; September 1935, p. 553-560.

The Coming of the Railroad, by Paul A. F. Walter. Address at Santa Fe Railroad Week banquet, June 13, 1935. El Palacio [School of American Research, Santa Fe, N. M.], July 1935, pp. 2-5.

Concurrence et Cooperation en Trafics Voyageurs et Marchandises entre Chemin de Fer et Automobile. A report on recent developments in service and regulatory laws in 25 European countries, made in June 1925 by the German and Swiss Federal Railways. Bulletin de l'Union Internationale des Chemins de Fer, July-August 1935, pp. 238-258.

The Dotsero Cutoff, by Arthur Ridgway. Illustrated. Journal of the Western Society of Engineers, June 1935, pp. 83-89.

Great Western Railway Special Centenary Number. Illustrated. Map of present system, pp. 26-27, shows also dates of opening of the various sections of the railway. Railway Gazette, London, England, August 31, 1935. Supplement, 52 p.

Is the Steam Locomotive Out-of-Date? by Prof. Dr.-Ing. H. Nordmann, of the German State Railways. Bulletin of the International Railway Congress Association, July 1935, pp. 857-875.

Mit der Kamera im Eisenbahnbetrieb, by Dr. Duesberg. Illustrated with photographs taken on and around German railways by picture-taking enthusiasts. Die Reichsbahn, July 3, 1935, pp. 754-757.

The Part That Railroad Transportation Has Played in the Development of Canada and the Relationship of the Railways to Other Forms of Transportation in the Future, by H. S. Till. Prize paper in 1935 competition. Author is secretary to general superintendent, Canadian National Railways, Edmonton, Alberta. Canadian Railway Club Proceedings, May 1935, pp. 24-32.

When the First "Iron Horse" Raced in 100 *Years Ago*, by John Clagett Proctor. Excitement on August 25, 1834 in Washington, D. C., when "great crowds from Washington, Georgetown, Alexandria and way stations" assembled to greet the first locomotives to enter the city. Washington, D. C. Sunday Star, August 18, 1935, part 4, p. F-2.

The World Crisis and the Railways. A series of detailed reports on the effects of economic and social conditions on the railways in various countries by E. Lavalle and E. Mellini, Ashton Davies, and Drs. Cottier and von Beck, together with discussion at sectional meeting of International Railway Congress Association, July 4-5, 1935. Bulletin of the International Railway Congress Association, April 1935, pp. 365-383; July 1935, pp. 771-796; September 1935, pp. 1105-1164.

New Books

Stage-Coach Days in The Bluegrass, by J. Winston Coleman, Jr., 286 pages, illustrated. Published by The Standard Press, Louisville, Kentucky, first edition limited to 325 copies.

No doubt the majority of our members are interested in the railroad era, yet here is a book which vividly portrays the days just preceding the coming of the railroad. For nearly three generations, stage-coaches and taverns played an important part in the development of this country. Mr. Coleman has consulted a great store of documents, newspapers and reports to present his account of the stage-coaches and taverns of Kentucky. Here the reader will find the trials and tribulations of stage-coach travel, opposition lines and accidents due to racing, taverns and tavern life, turnpikes and toll-gates are all set forth.

Chapter VII deals with the Lexington & Ohio R. R. This road, chartered one week after the Pontchartrain R. R., was the first railroad opened for service west of the Allegheny Mountains. The cars were first drawn by horses until some enterprising mechanics of Lexington constructed the first locomotive in Bruen's foundry. This locomotive made its trial run on March 2, 1833 but it never advanced beyond the experimental stage. It was not until 1835 that a locomotive was purchased in the east and regular trips were commenced.

Mr. Coleman has ably depicted the conditions which existed during this era and the book deserves a place in our library since it portrays the days before the coming of the "Iron Horse." Copies may be procured from the publisher—the price is $2.50.

ORNAM L. PATT

Ornam L. Patt, one of the earliest members of this Society, passed away on June 15th last. Known to many of our members in this section his death will be keenly felt by his friends.

Mr. Patt was born in Central Falls, Rhode Island, August 15th, 1865. In 1883 he obtained a position in the drafting room of the old Rhode Island Locomotive Works at Providence and then worked in the plant, learning every phase of locomotive construction. In 1903 he entered the office of the Public Works Department of the City of Providence and served the city well for thirty years. At the time of his death he was connected with the Old Colony Coal Company.

He was interested in railroads and locomotives as a boy. In his backyard, which was not far from the railroad, he organized a "Young Engineers' Club" and his father's shed was used for their meetings. The club had a limited membership of 25 and there were as many more on the waiting list. His visits to the different roundhouses in Providence, as a boy, brought him in contact with the Master Mechanics who took an interest in his hobby and supplied him with information of a technical and historical nature. All during his life he was interested in this subject and he was an authority on the early roads which entered Providence.

Mr. Patt attended the meeting of this Society which was held last May and during the course of conversation with the author, informed him that he had turned the bell placed on Maine Central R. R. locomotive #25, which this Society now has in the Baker Library. The bell was acquired purely by accident but it becomes doubly interesting now through the association of Mr. Patt.

The past year has witnessed the loss of two of our valued members. Herbert Fisher, for nearly thirty years associated with William Mason and Ornam L. Patt, for nearly twenty years associated with the Rhode Island Locomotive Works. Both men had first hand knowledge of the products of these plants, whose knowledge was unquestioned and both were staunch friends. They have gone and they have taken much of that knowledge with them but they have left behind a host of friends who will always cherish their friendship and memory.

In Memory of

WINFIELD M. BROWN,

— Life Member —

141 Milk Street

Boston, Massachusetts

Who died on August 23rd, 1935.